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ARNOLDIA



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BULLETIN OF POPULAR INFORMATION

VOLUME XXIV

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ARNOLDIA



A continuation of the
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NUMBER 1

REGISTRATION LIST OF CULTIVAR NAMES OF FAGUS L.

THE cultivars of *Fagus sylvatica* only are listed, since no cultivars of the other seven species have been found.

Group Names: It has become expedient to adopt the provisions of Article 13 of the International Code of Nomenclature for Cultivated Plants, which states that "Within a species or interspecific hybrid which includes many cultivars (varieties), assemblages of similar cultivars (varieties) may be designated as groups" as, for example, *Fagus sylvatica* Atropunicea Group 'Cuprea'. Two group names have been proposed, "Atropunicea Group" and "Variegata Group". Some of the cultivars in these groups are so similar it is most difficult to tell them apart, yet they rate individual cultivar names.

Accepted cultivar names are in large and small capitals. Synonyms are listed in roman type. Plants starred with an asterisk (*) are known to be in cultivation in the United States at the present time.

'Albo-marginata' ('E.S.', Gard. Chron. III. 26: 434. 1899). "A variegated form. The silvery variegation is generally prominent on the margin of the leaf, but some leaves have blotches and streaks of the same color" = 'ALBO-VARIEGATA' Variegata Group.

'ALBO-VARIEGATA'* Variegata Group (Weston, Bot. Univ. 1: 107. 1770). Leaves variegated with white.

'ANSORGEI'* Atropunicea Group (Schwerin, Mitt. Deutsch. Dendr. Ges. 13: 198. 1904). With lance-shaped, dark purple leaves, 1-2 cm. broad, and of weak growth. Originated about 1891.

'ARCUATA' (Schwerin, Mitt. Deutsch. Dendr. Ges. 28: 167. 1919). Similar to 'TORTUOSA' but with an extraordinary tangled appearance and supposed to be no longer in cultivation.

'ARGENTEO-MARMORATA' Variegata Group (Späth Cat. 104: 93. 1899). The leaves are "soft white, powdered and mottled."

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- 'Argenteo-variegata' (Jouin, Jardin **13**: 41. 1899) = 'ALBO-VARIEGATA' Variegata Group.
- 'ASPENIFOLIA'* (Duchartre in Jacques & Herincq, Man. Gén. Pl. **4**: 237. 1859).
Leaves narrow, linear, in various shapes.
- 'ATROPUNICEA'* Atropunicea Group (Weston, Bot. Univ. **1**: 107. 1770). Leaves red to reddish purple.
- Atropunicea Group — This group name is here adopted to include cultivars with reddish or purplish foliage, for differences in characteristics among some of these cultivars are not marked. It includes the following cultivars: 'ANSORGEI', 'ATROPUNICEA', 'ATROPURPUREA GLOBOSA', 'ATROPURPUREA MACROPHYLLA', 'BROCKLESBY', 'CUPREA', 'INTERRUPTA PURPUREA', 'NORWEGIENSIS', 'PURPUREA', 'PURPUREO-PENDULA', 'REYGERLOO', 'RIVERSII', 'ROHANII', 'SPAETHIANA', and 'SWAT MAGRET'.
- 'Atropurpurea' (Regel, Gartenflora **4**: 93. 1855). With leaves "dark red" = 'ATROPUNICEA' Atropunicea Group.
- 'ATROPURPUREA GLOBOSA' Atropunicea Group (A. Dervaes, Möller's Deutsch. Gärt.-Zeit. **42**: 287. 1927). A small, rounded variety with reddish leaves, similar in habit to *Acer platanoides* 'GLOBOSUM'.
- 'ATROPURPUREA MACROPHYLLA'* Atropunicea Group (Kirchner in Petzold & Kirchner, Arb. Muscav. 661. 1864). Similar to other purple beeches, but with slightly larger leaves.
- 'Atropurpurea Pendula' (Jäger in Jäger & Beiss., Ziergeh. Gart. & Park. 2nd ed. 155. 1884). The leaves are a dark red and the branches are pendulous = 'PURPUREO-PENDULA' Atropunicea Group.
- 'Atropurpurea Rohanii' (Henry in Elwes & Henry, Trees Gt. Brit. Irel. **1**: 8. 1906) = 'ROHANII' Atropunicea Group.
- 'Atropurpurea Tricolor' (Hort. ex Pynaert, Revue Hort. Belg. **12**: 145. 1886) = 'TRICOLOR' Variegata Group.
- 'Atro-rubens' (Du Roi ex Loudon, Arb. Frut. Brit. **3**: 1950. 1838). "The leaves when half developed are a cherry red, and when fully matured at mid-summer are of so dark a purple as to appear almost black" = 'PURPUREA' Atropunicea Group.
- 'Aurea' (Hort. ex Schelle, Beissner et al., Hand. Laubh.-Benenn. 62. 1903) = 'ZLATIA' Variegata Group.
- 'Aurea Spaethii' (Nicholson, Kew Hand-List Trees & Shrubs, ed. 2, 717. 1902) = 'ZLATIA' Variegata Group.
- 'AUREO-PENDULA'* Variegata Group (Van der Bom, Mitt. Deutsch. Dendr. Ges. **20**: 423. 1911). Originated in 1900 on a green-leaved plant. The leaves are pendulous and golden green; during the summer the color gradually turns green.
- 'Aureo-variegata' ("E. S.", Gard. Chron. III, **26**: 434. 1899). "Bright green leaves, splashed and streaked with golden yellow" = 'LUTEO-VARIEGATA' Variegata Group.

- 'BORNYENSIS'* (Bean, Garden London 55: 267. 1899). Originating before 1870 in Borny, France, this is a weeping beech with upright trunk, broadly columnar habit and branches "symmetrically pendulous", differing from 'PENDULA' because of its more fastigate habit.
- 'BROCKLESBY' Atropunicea Group (Jouin, Jardin 13: 41. 1899). Very similar to other purple beeches but with slightly larger leaves.
- 'CASTANAEFOLIA'* (Bean, Garden London 55: 267. 1899). "One of the cut leaved forms. A proportion of the leaf is divided into narrow, regular segments, almost reaching the midrib, other leaves are merely coarsely toothed."
- 'Circinata' (Hort. ex Krüssmann, Mitt. Deutsch. Dendr. Ges. 52: 115. 1939) = 'GRANDIDENTATA'.
- 'COCHLEATA'* (Kirchner in Petzold & Kirchner, Arb. Muscav. 659. 1864). A dwarf form with compact growth and cone-shaped habit.
- 'Comptoniaefolia' (Kirchner in Petzold & Kirchner, Arb. Muscav. 661. 1864) = 'ASPENIFOLIA'.
- 'CONGLOMERATA' (Jouin, Jardin 13: 42. 1899). A dwarf bush of rounded form, leaves small and contorted.
- 'Crispa' (Hort. ex Loudon, Arb. Frut. Brit. 3: 1952. 1838). "A monstrosity with the leaves small and almost sessile, and crowded into small dense tufts" = 'CRISTATA'.
- 'CRISTATA'* (Dumont de Courset, Bot. Cult. 6: 415. 1811). Slow growing, leaves on the twig ends, as a rule, but in a triangular shape and deformed.
- 'CUCULLATA' (Koch, Dendr. II, 2: 19. 1873). With smaller leaves than the species and with curled leaf margins.
- 'CUPREA'* Atropunicea Group (Loudon, Arb. Frut. Brit. 3: 1951. 1838). "Young leaves and shoots of a paler colour than those of the purple beech. . . in a state of repose, and on a dark cloudy day, it can hardly be distinguished from the common green-leaved beech."
- 'Cupreata' (Hort. ex Krüssmann, Mitt. Deutsch. Dendr. Ges. 52: 117. 1939) = 'CUPREA' Atropunicea Group.
- 'DAWYCKII'* (Hesse Cat., 1913-14: 120. 1913). A fastigate beech on the estate of the late Mr. F. R. S. Balfour of Dawyck, Scotland.
- 'FASTIGIATA'* (Simon-Louis ex Koch, Dendr. II, 2: 17. 1873). A narrow columnar form.
- 'FAUX DE VESEY'* (Meyer, F. G., Pl. Explor. ARS 34-32, 111. 1963). "When grafted upon a standard, plants develop horizontally spreading branches from the crown, these with somewhat pendulous tips." Probably identical with *F. sylvatica* 'TORTUOSA' found in the Forests of Verzy, France, for hundreds of years.
- 'GRANDIDENTATA'* (Hort. ex Kirchner, Petzold & Kirchner, Arb. Muscav. 662. 1864). "Leaves coarsely toothed, branches slender."
- 'Hartigii' (Schneider, Illus. Handb. Laubh. 1: 154. 1904). "Golden yellow

- bands showing between the nerves'' of the leaves = 'STRIATA' Variegata Group.
- 'Hepatica' (Ambrosi, Fl. Tirol. Merid. 2: 59. 1857). "Foliage chiefly liver colored on the outer branches exposed to the sun" = 'ATROPUNICEA' Atropunicea Group.
- 'Heterophylla' (Lodd. ex Loudon, Arb. Frut. Brit. 3: 1951. 1838) = 'LACINIATA'.
- 'HORIZONTALIS'* (Hort. ex Hesse Cat., 1932-33: 66. 1932). "A new form, valuable landscape growth form with completely horizontal growing branches." The parent plant is at the Botanic Garden of Munich, Germany.
- 'Ilicifolia' (Hort. ex Krüssmann, Mitt. Deutsch. Dendr. Ges. 52: 116. 1939) = 'LACINIATA'.
- 'Incisa' (Hort. ex Loudon, Arb. Frut. Brit. 3: 1951. 1838). "Leaves variously cut, sometimes in narrow shreds, so as to resemble ferns" = 'LACINIATA'.
- 'INTERRUPTA'* (van Hoey Smith, Deutsche Baumschule 7: 265; fig. 154. 1955). Selection made by van Hoey Smith at Rotterdam. Peculiarly cut up leaf, almost appearing compound, and of most irregular form.
- 'INTERRUPTA PURPUREA'* Atropunicea Group (Meyer, F. G., Pl. Explor. ARS 34-32. 111. 1963). "Similar to 'INTERRUPTA' except the leaves are purplish."
- 'KING' (Elwes in Elwes & Henry, Trees Gt. Brit. Irel. 1: 20. 1906). A famous beech at Knole Park in Sevenoaks, England, which in 1905 had "the largest girth of any beech I know standing in England." At five feet above the ground the girth was thirty feet. This may not have been propagated.
- 'LACINIATA'* (Vignet in Schmidt, Samml. Phys.-Oekon. Aufs. 1: 173. t. 1. 1795). Leaves deeply cut or lobed.
- 'LATIFOLIA'* (Kirchner in Petzold & Kirchner, Arb. Muscav. 662. 1864). With large leaves, 3-6 inches long and 2-4 inches wide.
- 'LUTEO-VARIEGATA' Variegata Group (Weston, Bot. Univ. 1: 107. 1770). Leaves variegated with yellow.
- 'Macrophylla' (Hort. ex Dippel, Handb. Laubh. 2: 52. 1892). "Leaves large and broad" = 'LATIFOLIA'.
- 'Marmorata' (Schneider, Illus. Hand. Laubh. 1: 154. 1904). "Abnormal white variegation" = 'ARGENTEO-VARIEGATA' Variegata Group.
- 'MILTONENSIS' (Henry, Garden London 1: 267. 1899). Originated at Milton Park, Northamptonshire, England. "A weeping beech with erect trunk and branches horizontal and pendulous."
- 'Milton Variety' (Jouin, Jardin 13: 41. 1899) = 'MILTONENSIS'.
- 'MONSTROSA' (Kirchner in Petzold & Kirchner, Arb. Muscav. 662. 1864). Smaller habit than wild plants, with monstrous leaves, very dark green on upper surface and pubescent beneath.
- 'NANO-PENDULA' (Domin, Vereinss. Forst-, Jagd., & Naturk. 57: 12-25. 1867). A dwarf pendulous form.

- 'Nigra' (Hort. ex Schelle, Beissner et al., Hand. Laubh.-Benenn. 61. 1903). Listed without description. Probably a synonym of 'PURPUREA'.
- 'Nigra Pendula' (deVos, Woordenboek 46. 1867) = 'PURPUREO-PENDULA' Atropunicea Group.
- 'NIVEA' Variegata Group (Masse, Revue Hort. IV. 1: 369. 1852). Weak growing, leaves white to streaked white, branchlets red; probably never more than a shrub because of weak growth. Probably not now in cultivation.
- 'Norwegica' (Krüssmann, Mitt. Deutsch. Dendr. Ges. 52: 118. 1939) = 'NORWEGIENSIS' Atropunicea Group.
- 'NORWEGIENSIS'* Atropunicea Group (Hillier Cat. #34T: 22. 1923). Purple leaves, but not so dark as those of 'SWAT MAGRET'.
- 'PAGNYENSIS'* (Simon-Louis, Cat. 1868-69, name only; Schelle in Beissner et al., Hand. Laubh.-Benenn. 61. 1903). Similar to *F. sylvatica* 'TORTUOSA', if not identical.
- 'PAUL'S GOLD-MARGINED' Variegata Group (Anon., Proc. Hort. Soc. London 27: 92. 1902). "Free growing, pale green leaves irregularly margined with yellow."
- 'PENDULA'* (Lodd. ex Loudon, Arb. Frut. Brit. 3: 1952. 1838). First listed in 1836, the branches are "beautifully pendant, and even the last six feet of the top bend down." The larger limbs are usually horizontally spreading.
- 'PRINCE GEORGE OF CRETE' (Bean, Trees & Shrubs Brit. Is. 1: 552. 1914). Leaves up to 7 inches long and $5\frac{1}{2}$ inches wide, "an unusually large-leaved form." Sent to Kew in 1898 by the gardener of the King of Denmark.
- 'PURPUREA'* Atropunicea Group (Aiton, Hort. Kew. 3: 362. 1789). "With foliage blackish red." Loudon (Arb. Frut. Brit. 3: 1952. 1838) stated that all the purple-leaved beeches in Europe have come from one tree found in the woods in Germany in the middle of the eighteenth century.
- 'Purpurea Colorata' (Schelle, Beissner et al., Hand. Laubh.-Benenn. 61. 1903). Listed without description as a synonym of 'Purpurea' = 'PURPUREA' Atropunicea Group.
- 'PURPUREA LATIFOLIA' A name which has been used since 1903 (Schelle, Beissner et al., Hand. Laubh.-Benenn. 61. 1903), but apparently never described. It is supposed to be the name most used in Europe to designate grafted purple beech (as compared to seedlings).
- 'Purpurea Macrophylla' (Schelle, Beissner et al., Hand. Laubh.-Benenn. 61. 1903) = 'ATROPURPUREA MACROPHYLLA' Atropunicea Group.
- 'Purpurea Major' (Hort. ex Schelle, Beissner et al., Hand. Laubh.-Benenn. 62. 1903). Listed without description. Is probably the same as 'ATROPURPUREA MACROPHYLLA' Atropunicea Group.
- 'PURPUREA METALLICA NIGRA' (Hort. Walter ex Schelle, Beissner et al., Hand. Laubh.-Benenn. 61. 1903). Listed without description.
- 'Purpurea Norwegiensis' (Nicholson, Kew Hand-List Trees & Shrubs, ed. 2, 717. 1902). Listed without description. = 'NORWEGIENSIS' Atropunicea Group.

- '*Purpurea Pendula*' (Jäger & Beiss., Ziergeh. Gart. & Park. 225. 1865) = 'PURPUREO-PENDULA' *Atropunicea* Group.
- 'PURPUREA PENDULA NANA' (Hort. ex Dippel, Handb. Laubh. 2: 52. 1892). Listed without description.
- 'PURPUREA PENDULA NOVA' (Hort. ex Dippel, Handb. Laubh. 2: 52. 1892). Listed without description.
- '*Purpurea Pendula Reygerloo*' (Dippel, Handb. Laubh. 2: 52. 1892) = 'REYGERLOO' *Atropunicea* Group.
- 'PURPUREA PENDULA VERA' (Schelle, Beissner et al., Hand. Laubh.-Benenn. 62. 1903). Listed without description.
- '*Purpurea Roseo-marginata*' (Henry in Elwes & Henry, Trees Gt. Brit. Irel. 1: 8. 1906) = 'ROSEO-MARGINATA' *Variegata* Group.
- 'PURPUREO-PENDULA'* *Atropunicea* Group (Jäger in Jäger & Beiss., Ziergeh. Gart. & Park. 225. 1865). A pendulous form with purple leaves.
- 'PYRAMIDALIS' (Kirchner in Petzold & Kirchner, Arb. Muscav. 662. 1864). An upright pyramidal form.
- 'PYRAMIDALIS PURPUREA' (Bean, Kew Hand-List Trees & Shrubs, ed. 3, 307. 1925). Listed without description.
- 'QUEEN' (Elwes in Elwes & Henry, Trees Gt. Brit. Irel. 1: 20. 1906). A famous beech at Knole Park in Sevenoaks, England, 100 feet high, 130 foot spread with a trunk 21 feet in circumference. This may not have been propagated.
- 'QUERCIFOLIA'* (Booth Cat. ex Kirchner in Petzold & Kirchner, Arb. Muscav. 662. 1864). With oak-like leaves.
- 'QUERCINA' (Hort. ex Schelle, Beissner et al., Hand. Laubh.-Benenn. 62. 1903). Listed without description.
- 'QUERCOIDES' (Persoon, Trans. Linn. Soc. Lond. 5: 233, t. 11. 1800). "The bark of the trunk and larger branches is entirely formed like that of an oak." A tree in Reinhausen, Germany, was dying in 1800.
- 'REMILLYENSIS' (Simon-Louis Cat. 1868-69, name only; Jouin, Jardin 13: 41. 1899). A low, compact, tightly growing tree with slightly arching and drooping branches and umbrella-like shape.
- 'RETROFLEXA' (Hort. ex Dippel, Handb. Laubh. 2: 51. 1892). Rounded crown, branches at first upright, then hanging pendulous to the ground.
- 'REYGERLOO'* *Atropunicea* group (Krüssmann, Mitt. Deutsch. Dendr. Ges. 52: 117. 1939). A red-leaved variety with pendulous branches.
- 'RIVERSII'* *Atropunicea* Group (Rehder in Bailey, Cycl. Amer. Hort. 2: 570. 1900). "Very dark purple leaves and compact habit." This is said to have been selected by the British nurseryman Thomas Rivers prior to 1900.
- 'ROHANI'* *Atropunicea* Group (Koerber, Fromme's Oester.-Ungar. Gartenk. 19: 1 März. 1894). "With purple leaves similar in general shape to those of 'LACINIATA'."

- 'ROSEO-MARGINATA'* Variegata Group (Cripps, Gard. Chron. III. 3: 779. 1888).
 "Leaves purple with an irregular light pink border."
- 'ROTUNDIFOLIA'* (Jackman, Hibberd's Gard. Mag. 37: 339. 1894). With small, rounded leaves $\frac{3}{4}$ -1 $\frac{1}{2}$ inches long, about the smallest orbicular leaves of any of the clones of *Fagus sylvatica*. Apparently this originated at Brookwood, Knap Hill, Woking, England, in 1872 and was put into commerce later by Jackman Nursery of Woking, England. It was listed as "new" without description in Jackman's Cat. 26. 1878.
- 'Rotundifolia Minor' (Jurissen ex Späth Cat. 79: 9. 1890). Listed without description. = 'ROTUNDIFOLIA'.
- 'RUBRA' (Anon. in Jour. Roy. Hort. Soc. 39: 795. 1914). Listed without description.
- 'Salicifolia' (Hort. ex Loudon, Arb. Frut. Brit. 3: 1951. 1838). "Leaves variously cut, sometimes in narrow shreds so as to resemble ferns." = 'ASPLENIFOLIA'.
- 'Sanguinea' (Persoon, Syn. Pl. 2: 571. 1807) "foliage blackish-red" = 'ATROPUNICEA' Atropunicea Group.
- 'SPAETHIANA'* Atropunicea Group (Späth, Späth-buch 1720-1920. 230. 1920).
 Leaves red with the under surface a distinct blackish red.
- 'STRIATA' Variegata Group (Bose, Allg. Forst- Jagd-Zeit. 27: 46. 1851). Normal growth and normal leaves at first green, then with bright yellow-green stripes along the main veins.
- 'SUBCORDATA' (Murr, Deutsch. Bot. Monatsschr. 18: 194. 1900). With "clearly heart shaped leaves."
- 'Suentelensis' (Hort. ex Schelle, Beissner et al., Hand. Laubh.-Benenn. 61. 1903). Listed without description. = 'TORTUOSA'.
- 'Suntalensis' (Hort. ex Beissner, Mitt. Deutsch. Dendr. Ges. 6: 84. 1897). A dwarf beech. = 'TORTUOSA'.
- 'SWAT MAGRET'* Atropunicea Group (Späth, Späth-buch 1720-1920. 230. 1920).
 Introduced about 1895, this is a red-leaved beech with the leaves opening 8-10 days earlier than those of 'ATROPUNICEA'. Also, these leaves hold their black-red color longer in the fall.
- 'TORTUOSA'* (Pepin, Revue Hort. 1861: 84. 1861). "Dwarf and spreading form, with twisted and contorted branches, pendulous at the tips." Plants of this have been known to be in the forests of Verzy, France, for hundreds of years, and some are still growing there. The first one brought into cultivation should have the cultivar name 'TORTUOSA'. Other named cultivars have been obtained from the same source.
- 'TRICOLOR'* Variegata Group (Simon-Louis ex Koch, Dendr. 2 (2): 18. 1873).
 "Leaves nearly white, spotted green with a pink margin."
- 'Undulata' (Hort. Simon-Louis ex Jouin, Jardin 13: 42. 1899) = 'COCHLEATA'.

'VARIEGATA'* (Duchartre in Jacques & Herincq, Man. Gén. Pl. 4: 237. 1857). Leaves particolored with white and yellow, interspersed with some streaks of red and purple. Many variegated plants have been found in the wild.

Variegata Group — This group name is taken to include all those cultivars with leaves variegated with any color of white, yellow, pink or varying shades of green. These cultivars include the following: 'ALBO-VARIEGATA', 'ARGENTEO-MARMORATA', 'AUREO-PENDULA', 'LUTEO-VARIEGATA' 'NIVEA', 'PAUL'S GOLD-MARGINED', 'ROSEO-MARGINATA', 'STRIATA', 'TRICOLOR', 'VARIEGATA', 'VIRIDI-VARIEGATA' and 'ZLATIA'.

'Versicolor' (Kuntze, Taschen-Fl. Leipzig. 239. 1867) = 'ATROPUNICEA' Atropunicea Group.

'VIRIDI-VARIEGATA' Variegata Group (Lombarts Cat. 1935-36: 75. 1935). "Dark green leaves with light green spots."

'ZLATIA'* Variegata Group (Späth Cat. 88: 89. 1891; Goeze, Gard. Chron. III. 12: 669. 1892). Leaves at first yellow, later turning green at maturity.

DONALD WYMAN

ARNOLDIA



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LABELS IN THE ARNOLD ARBORETUM

REQUESTS are constantly being received at the Arnold Arboretum for information regarding the labels used on the thousands of trees and shrubs growing here. Many types are available and those found satisfactory in one place may not prove to be the same elsewhere.

Labels in the Arnold Arboretum must be:

1. Low in cost
2. Easily made
3. Sturdy

Since thousand of labels must be made every year by our own crew during the winter months and unfortunately become exposed to occasional vandalism, it is easily seen that they should meet those three prime requisites.

Other kinds have been tried over the years, but the types described here have proved satisfactory after many years under our conditions.

Embossed or Record Label

Every plant of sufficient size to be placed in the collections has a label showing its record number, scientific name, the type of material which was originally received (whether plant, cutting, graft or seed), place of origin and sometimes the date, although this is also indicated by the record number. These are made on $\frac{7}{8}$ -inch zinc tape (no. 018 gauge) purchased from Alles Corporation, 225 Msgr. O'Brien Highway, Cambridge, Massachusetts. Each carton contains six 100-foot rolls and currently a carton costs \$17.50.

These labels are made on a Graphotype embossing press (Addressograph Model 6340, priced in 1962 at \$1900). This press is electrically operated, having a keyboard similar to a standard typewriter. Another embossing press used by the Arnold Arboretum is the hand operated Model T-40 "Tapewriter" (Roovers, Inc., Duryea, Pennsylvania, priced in 1962 at \$735). This machine can emboss from one to five lines.

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Labels are made on either of these machines by our own men during the winter months. This label is attached to a branch by means of no. 18 gauge copper wire and will last as long as the wire. Recently some labels were removed which must have been on the plants for twenty years and were still in perfect condition. Thousands of these are made each year since some are inadvertently removed in pruning, others are "lost" in the center of shrubs and still others occasionally break off and fall after slapping against the tree trunks.

Plastic Labels

In a few of the protected areas about the greenhouse and in the plant beds at the Case Estates in Weston we are starting to use the laminated plastic labels. These certainly look well for the first few years, but their long-term durability under New England weather conditions is not yet known. These are made of layers of white and black plastic. The router bit of the engraving machine used for cutting out the letters merely cuts through the layer of black plastic on top, thus exposing the white underneath (Plate I). The engraving machine is made by the Green Instrument Company, 295 Vassar Street, Cambridge, Massachusetts (Model 106, with accessories, costing about \$425 in 1962). The plastic material varies in size and thickness to meet specific requirements. The labels are placed in aluminum holders stuck in the ground.

Wooden Display Label

These are made of white pine strips $8\frac{3}{4}$ inches long, $1\frac{1}{2}$ inches wide and $\frac{3}{8}$ inch thick, planed on all four sides. Pressure paint sprayers are used to apply the paint. DuPont "Dulux Outside White" is used, the first coat thinned somewhat, the second with as little thinning as possible. Special racks have been made to accommodate as many as 2000 labels at one time while being sprayed.

The printing of the labels is done from carefully prepared lists which include the scientific and common names of the plant and its habitat, set up as they are to appear on the label. The rubber type used (from R. A. Stewart Company, 80 Duane Street, New York, New York) is set up in special holders made to conform to the size of the label. Three sizes of type are used: nos. 105, 851 and 998. A special long-lasting ink (Special Black no. 54c 5479) is obtained from the Interchemical Company, 175 Albany Street, Cambridge, Massachusetts, and the fluid for cleaning the ink from the rubber type is "Fedroid" made by the James H. Matthews Company, 375 Broadway, Boston. The ink is applied to the type by a rubber roller and the type holder and label are pressed tightly together with a small binding press borrowed from the library. We have found it expedient to make twice the number of labels currently needed. The extras go into a file for future use.

When the ink is thoroughly dry a coat of DuPont "Clear Varnish" RAK-190 is sprayed on the printed side of the label. This improves the appearance of the label and extends its usefulness several years. Finally, two small holes are drilled

100

1000

**JUNIPERUS PROCUMBENS
PROCUMBENT JUNIPER**

JAPAN

ENKIANTHUS PERULATUS

JAPAN

WHITE ENKIANTHUS

COTONEASTER
HORIZONTALIS
ROCK COTONEASTER

THE
JOURNAL
OF
THE
ROYAL
ANTHROPOLOGICAL
INSTITUTE
OF GREAT BRITAIN
AND IRELAND
PART I
1901

Labels at present in use at the Arnold Arboretum. Upper left: Trunk label. Upper right: Stand label. Center: Wooden display label. Lower left: Laminated plastic label. Lower right: Embossed record label.

in one end of the label and it is strung with no. 16 gauge copper wire for hanging on the plant. We find that with this treatment these wooden labels will remain on the plants in good condition for approximately ten years.

Metal Display Labels

These are of two types (Plate I), one with two holes is put on a metal stand placed before a low shrub and the other, with four horizontal slits, is nailed to a tree trunk with galvanized nails. The nails are placed as close together as the slits allow and, when driven into the tree trunk, at least one inch of the nail should protrude so that there is room for growth as the tree increases in girth. Both metal display labels are made of cold rolled steel; in the case of the trunk label, 20 gauge metal cut $4\frac{1}{2}$ inches by $6\frac{3}{4}$ inches; in the case of the stand label, we use 18 gauge metal cut 4 inches by $6\frac{1}{4}$ inches. Both types of unpainted plates are made for us by W. T. von Schoppe, 35 Otis St., Watertown, Mass. They are first washed with DuPont "Prep-Sol" no. 3919 to remove the oily film from the metal, then wiped thoroughly dry and sprayed with one priming coat of DuPont "Preparakote Gray" followed by two coats of DuPont "Dulux Yellow" no. 93-24441, the paint being thinned only enough to allow smooth spray applications. In most cases "Vari-Temp Reducer" no. T3864 is satisfactory, but if spraying is done in a cold room, then Reducer no. T8508 is used. The labels are then printed in the same manner as the wooden labels and finally sprayed with a coat of DuPont "Clear Varnish" RAK 190.

Carved Wooden Directional Signs

Signs are placed about the Arboretum to show visitors the paths leading to the main collections and to the exit gates. These are made of first quality cypress planks, 30 inches long, 12 inches wide and 2 inches thick, but of course other woods might also be used. They are carved on a regular drill press, using a 5/16-inch router bit ground to make a V cut. At first these signs were coated with linseed oil, but it was found that after several years the wood darkened materially, making the letters difficult to read from a distance. To avoid this, a dark shingle stain is now used and the letters are painted with a bright yellow weather proof paint which lasts for several years.

It is necessary, of course, to keep a complete set of maps showing the location of the plants growing in the various areas and to check them from time to time for missing labels. Some collections, such as the lilacs, are reviewed every year, while otheas are done every three years. These, then, are the labels and methods of making them at present in use in the Arnold Arboretum.

HEMAN A. HOWARD

ARNOLDIA



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BLACK POLYETHYLENE AS A MULCH

THE Arnold Arboretum exhibited 24 different kinds of mulching materials in the New England Flower Show at Boston this spring, an educational exhibit which caused much favorable comment. Experiments and experience both have shown that in Massachusetts almost any material which can be used as a mulch results in better plant growth than where no mulching is used. There are many kinds of materials available, but one should consider several important points in making selections.

For instance, the appearance and suitability of the material is important. A mulch should be neat in appearance; it should not blow away in a high wind or wash away in a rain storm; it should not contain harmful materials to be leached out into the soil and cause damage to the plants.

A mulch should be easily applied and not too heavy to handle. Spent hops have been used in the Arboretum with good success, but the material as it comes from the brewery is 87 percent water and so is heavy to handle. Cocoa shells have been used also, but this is dry as a bone and very light when it is obtained. Crushed gray stone may be used as a mulch and it looks well, but it is heavy to handle and must be removed when the soil is to be worked, since it does not disintegrate. Maple leaves, when applied as a deep mulch, have a tendency to pack tightly and thus reduce the amount of air which is so necessary in the upper layers of soil where the feeding roots are located.

The cost and availability of a mulch are, of course, important. Ground redwood bark and ground sugar cane (bagasse) may be excellent mulching materials in areas where they are easily available locally, but shipping costs to the New England area make these rather costly when compared with others.

Finally, the length of time the mulch is serviceable is important. Some may last only a year or two, while others may remain in good condition for four years or longer, if undisturbed.

When planting trees and shrubs in sod, the area where the soil was disturbed

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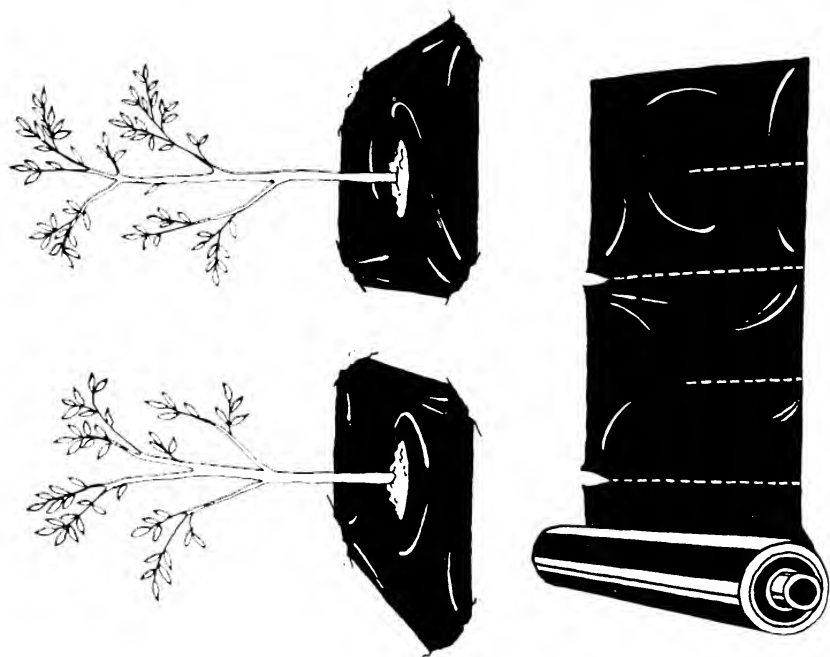


PLATE II

in the planting process is quickly overgrown with grass. This may look well as far as the lawn is concerned, but it can be bad for the young plant since the vigorous growing grass (and/or weeds) will compete with the plant in its struggle for nourishment and moisture from the upper few inches of the soil.

If a mulch is applied in a ring around the tree, grass and weeds are reduced or eliminated and more nourishment and moisture become available for the young plant. After a few years, if the tree is well established, it can compete favorably with the grass, but those first few years are very important in the success or failure of that young plant.

Polyethylene film is an ideal material for all kinds of horticultural uses. In fact, we could hardly do without it today. The use of black polyethylene as a mulching material has been widely and successfully tried with vegetables, pineapples and certain flower crops. It is now easy to use black polyethylene when planting trees and woody shrubs merely because an enterprising company in New Jersey has begun to manufacture and merchandise it in large or small quantities in a form easily used by anyone.

Five years ago we placed black polyethylene squares around some plants at the Case Estates in Weston, merely to see whether it would prove a satisfactory mulch. *Cornus mas*, *Fiburnum dilatatum*, a few crab apples and some grape vines were selected as the subjects for trial. Some of the plants were only about four feet tall at the time and had been struggling along in the same situation for three years, having a most difficult time because the soil in these areas is gravelly and extremely dry. They wilted occasionally unless watered during the hot summer, an indication that they would not grow well, or possibly live long in those situations, unless something were done. Four-foot squares of black polyethylene were placed around them in 1958 and the plants have thrived ever since.

Black polyethylene as a mulching material aids in the conservation of soil moisture about the plant. Holes are punched at a few places to allow the water to drain through. Of course no weeds or grass grow underneath. Also, one of the important properties of any polyethylene film is that most gases can diffuse through it normally, but water vapor cannot. Hence this does not cut off normal soil aeration as do many thickly applied mulches, and definitely conserves soil moisture by preventing water evaporation from the soil covered by the polyethylene.

The Gerling Plastics Company (a department of Monsanto Chemical Company) of Kenilworth, New Jersey, started manufacturing these squares in 1961 (available from Eastern States Farmers Exchange outlets), although black polyethylene

Plate II. Left: Sketch showing the roll of perforated black polyethylene squares and method of "digging in" the corners when laid about the base of the plants. Right: The black polyethylene was laid about the base of this *Cornus mas* 5 years ago when this plant was 3 feet tall. The polyethylene is in good condition with a few leaves and twigs on top, and grass which has overgrown slightly from the edge, but it saved this plant from dying in very poor, dry soil. The plant is now 8 feet tall.

had previously been available in rolls. These squares are marketed in rolls with perforations at three- or four-foot intervals so that they may be easily torn from the roll, square by square. There is also a perforation line to the center of the square so that this can be opened and fitted around the tree trunk and they are being used in large numbers in planting young fruit orchards of various kinds about the country.

We have found it advisable to dig the four corners of the film square into the grass sod, merely by lifting a piece of sod, placing the corner underneath and letting the sod fall back into place. This is better than placing stones on the corners. Also, it is advisable to punch a few holes with a nail or an ice pick in the depressions, merely to insure that rain water will leak through to the soil underneath.

Black polyethylene (of 2 mil. thickness) thus placed has lasted for five years about the few shrubs and trees at the Case Estates and is still in serviceable condition. One must be careful that the film is not cut with the lawn mower, but other than that, this mulch needs no attention whatsoever.

One square may cost six to twenty cents (depending on the size and thickness of the film), which is little enough when one considers the fact that the plant has a far better chance of survival and may sometimes grow twice as much in one year because of the mulch.

Placing a layer of black polyethylene film on the soil as a mulch around a tree or shrub at planting time is the surest and most inexpensive way of obtaining good growth during the first five critical years that follow.

DONALD WYMAN

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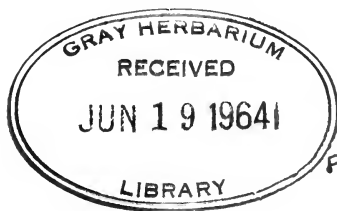
CLIMBING HYDRANGEAS AND THEIR RELATIVES

THE climbing habit is relatively rare in the family Saxifragaceae, the majority of the species being shrubs. All the climbing species, which are found in four genera, *Hydrangea* Linnaeus (hereafter abbreviated as L.), *Schizophragma* Siebold & Zuccarini, *Decumaria* L., and *Pileostegia* Hooker & Thomson, utilize the same method of climbing, i.e., attachment to a supporting substrate by means of fine rootlets arising directly from the upright stems (a method of climbing similar to that of poison ivy, *Rhus toxicodendron* L.). In nature, climbing is accomplished on tree trunks, which implies that the plants are adapted, of necessity, to growing under conditions of low light intensity. This combination of peculiar characteristics enhances the horticultural possibilities of these plants by permitting the growth of fine specimens on shaded walls or trees. The beauty of the foliage of plants grown under such conditions (not to mention the relative freedom from insect damage) is reason enough to warrant the serious consideration of the homeowner. Moreover, in many of the species, showy inflorescences add to the beauty of the plants to such a degree that one wonders why they have not been more widely grown.

The family Saxifragaceae has yielded many plants with extensive horticultural uses. Certain genera, such as *Astilbe* Buchanan-Hamilton, *Deutzia* Thunberg, *Heuchera* L., *Hydrangea* L., *Philadelphus* L., and *Ribes* L., have found particular favor because of their great variety and the relative ease with which they may be grown. The Saxifragaceae includes not only the ornamental genera mentioned above but also about 70 others.

The family is distinguished from related families (Rosaceae, Crassulaceae, Cunoniaceae) on the basis of technical characteristics such as the leaves usually lacking stipules, the relatively few stamens and pistils (primarily two carpels), and the abundant endosperm in the seed. These characters may seem to be relatively esoteric to the layman; that they appear so to some taxonomists as well is reflected in various taxonomic schemes designed to divide the family into a series

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of smaller families, in order to obtain greater morphological cohesiveness in each. The outstanding example of this viewpoint is that of Hutchinson who divided the family into eleven: Baueraceae, Donatiaceae, Eremosynaceae, Escalloniaceae, Francoaceae, Grossulariaceae, Hydrangeaceae, Philadelphaceae, Pterostemonaceae, Saxifragaceae, and Vahliaceae. It is not my intention to discuss the merits of this alternate and extreme system but to maintain the family in the broad sense and to discuss the climbing species in particular.

Botanists, regardless of field of specialization, tend to study and discuss natural groups of plants, such as families, genera, or closely related species. There is no question that this is the most satisfactory approach, both for the botanist and the layman. In this paper, I prefer to discuss only those species of Saxifragaceae which have in common the scandent habit. Such grouping by growth form may be considered unnatural or artificial, but the similarity of possible horticultural application has prompted me to present these plants as a group. The names used are those currently accepted, and for each I have added the original literature citation. Synonyms and their equivalents are treated in a name-finding list at the end of the paper. Those interested in the intricacies of the nomenclature are referred to the recent studies cited in the bibliography.

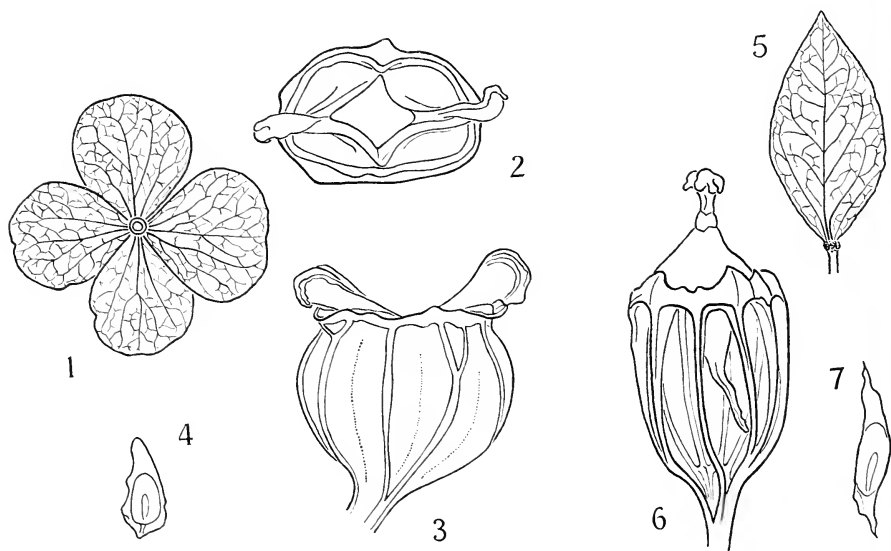


PLATE III

Figs. 1-4. *Hydrangea anomala* subspecies *petiolaris*. 1, Sterile flower showing petal-like development of the four calyx lobes, $\times 1$. 2, Top view of capsule, $\times 7$. 3, Side view of capsule, $\times 7$. 4, Seed, $\times 7$. Figs. 5-7. *Schizophragma hydrangeoides*. 5, Sterile flower showing petal-like development of a single calyx lobe, $\times 1$. 6, Side view of capsule, $\times 7$. 7, Seed, $\times 7$.

KEY TO THE IDENTIFICATION OF CLIMBING GENERA

- a. Inflorescences with fertile flowers and with or without showy sterile flowers, the sterile flowers with 4 calyx lobes much enlarged and petal-like, the fertile flowers with 2-4 or rarely 5, completely free, recurved styles; fruit opening by a terminal pore between the styles. I. *Hydrangea*
- a. Inflorescences with fertile flowers and with or without showy sterile flowers, the sterile flowers with 1 calyx lobe enlarged and petal-like, the fertile flowers with the styles erect and fused; fruit opening by the disintegration of tissue between the conspicuous ribs.
 - b. Leaves deciduous; fertile flowers with free petals; sterile flowers either present or absent.
 - c. Fertile flowers with 8-10 stamens, 4 or 5 petals; sterile flowers (usually present) with 1 calyx lobe enlarged and petal-like. II. *Schizophragma*
 - c. Fertile flowers with 20-30 stamens, 7-10 petals; sterile flowers never present. III. *Decumaria*
 - b. Leaves persistent, the plants evergreen; fertile flowers with fused petals which fall off together as a cap (calyptra); sterile flowers absent. . . IV. *Pileostegia*

I. HYDRANGEA L.

The name *Hydrangea* is derived from Greek *hydor*, water, and *angeion*, vessel or container, an allusion to the shape of the mature capsules. This genus has been the subject of a lifetime study by the noted horticulturist Haworth-Booth and of a scientific monograph (1957) by Dr. Elizabeth McClintock. The following treatment is based largely on McClintock's study which readers are urged to consult if more detailed information is desired. She recognizes the genus as being composed of two sections, HYDRANGEA and CORNIDIA, containing eleven and twelve species respectively. The horticulturally important species are all members of Sect. HYDRANGEA. The scandent species, however, have one representative in Sect. HYDRANGEA and twelve in Sect. CORNIDIA. Therefore, a total of thirteen species are climbing, or at least have this potentiality under suitable conditions, and so are of particular interest.

KEY TO THE SECTIONS

- a. Leaves deciduous; immature inflorescences usually not enclosed by bracts; petals (in fertile flowers) free or (in our species) connate (fused) and falling together as a cap. Sect. *Hydrangea*
- a. Leaves persistent; immature inflorescences always enclosed by bracts; petals (in fertile flowers) free and falling separately. Sect. *Cornidia*

SECTION HYDRANGEA

Only one species of this section, *Hydrangea anomala* D. Don, is scandent. In addition, it also has fused petals which fall together as a cap and winged seeds. These technical characteristics distinguish it from all other species of the genus. McClintock has treated *H. anomala* as being composed of two subspecies, although previous authors have recognized these as two distinct species. She points out,

quite correctly, that the variation within the species is slight and that only a single character, in conjunction with geographic distribution, can be used to separate the two subspecies. Of the two, subspecies *petiolaris* seems more hardy, but there is no other significant horticultural difference between them. My later comments apply equally to both subspecies.

1. *Hydrangea anomala* D. Don, Prodrumus Florae Nepalensis. 211. 1825.

KEY TO THE SUBSPECIES

a. Stamens 9-15; plants of the Himalaya and western and central China.

1a. *H. anomala* subsp. *anomala*

a. Stamens 15-20; plants of Japan, Formosa, and associated islands.

1b. *H. anomala* subsp. *petiolaris* (Siebold & Zuccarini)

McClintock, Journal of the Arnold Arboretum 37: 373. 1956.

This species, known as the "climbing hydrangea," was introduced into horticulture in the United States in 1865 by Mr. Thomas Hogg, who was consul to Japan, and together with his brother James, operated a nursery in New York. In addition to their own nursery, these gentlemen distributed seed to Parson's Nursery of Flushing, New York. The introductions were made under the incorrect name *Schizophragma hydrangeoides* which led to the mistaken belief that the Arnold Arboretum (rather than Messrs. Hogg) was responsible for the first introduction of *Hydrangea anomala*. In 1876, the Arboretum received seed from Japan (presumably subspecies *petiolaris*) and has grown the species since that time. According to Haworth-Booth, *Hydrangea anomala* subsp. *anomala* was introduced into Great Britain in 1839, with subsp. *petiolaris* following in about 1878. To the best of my knowledge, subspecies *anomala* was introduced into the United States by the Arnold Arboretum in 1923. Our plant flowered in 1961 and 1964 and remains relatively small.

The dark-green glossy leaves of *Hydrangea anomala* unfold in the spring, becoming fully expanded prior to those of other deciduous climbers (such as *Parthenocissus* Planchon or *Campsis* Loureiro). The leaves, in general, are heart-shaped, smooth, long-petiolate, and with serrate margins. The density of the leaves seems to vary from plant to plant, depending on the immediate growing conditions. Lateral branches tend to grow at right angles from the main climbing shoots, their length being irregular but seldom exceeding three feet, forming an uneven leafy pattern which is unobtainable with standard climbers such as *Parthenocissus tricuspidata* (Siebold & Zuccarini) Planchon and *Hedera helix* L.

The lateral branches bear terminal inflorescences which open in June, coming into full bloom before the other hydrangeas hardy in our area. The inflorescences, usually six inches or more in diameter, are composed of several hundred small fertile flowers surrounded by a corona of a dozen or more sterile ones. The latter, are white and borne on long pedicels which accentuate their peripheral position. When compounded by several hundred inflorescences the results are more than

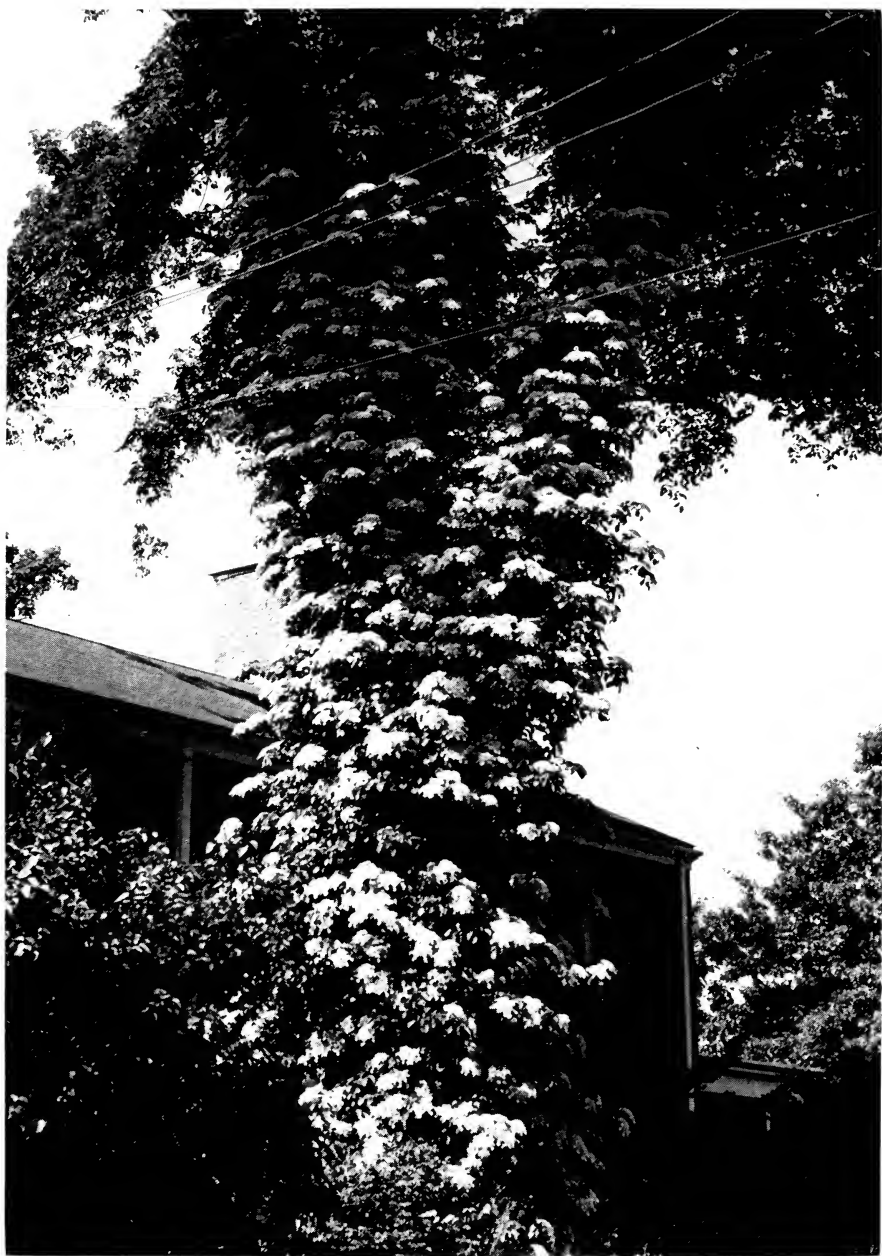


PLATE IV

Tree-grown specimen of *Hydrangea anomala* subspecies *petiolaris* during flowering period.

gratifying. The calyx lobes of the sterile flowers are much enlarged, being $\frac{1}{2}$ to $\frac{3}{4}$ inches long and nearly as broad, rounded in outline. The white color is retained long after the fertile flowers have passed, creating the impression of an extraordinarily long blooming period.

The fruit, technically a capsule, is small (about $\frac{3}{8}$ inch long), opening by a pore formed at the base of the spreading styles. The number of styles varies in this species from two to three in individual flowers: the majority have two styles, although the larger tend to be 3-stylar. The significance of this variation is not understood. The fruits are not attractive, nor is there any notable leaf coloration in the fall. During the winter, the stems and lateral branches are interesting because of their growth pattern and the yellowish-orange bark which peels irregularly into large, thin flakes.

Plants of this species are found in nature, not only as powerful tree climbers, but also as scramblers in shaded rocky ravines. Their diverse horticultural applications are based, at least in part, on their adaptation to these environments. The species may be used effectively as a ground cover in difficult places, such as rock-piles or rocky outcrops, even in shaded areas. Likewise, it does very well on stone fences or brick walls, although the rate of growth is retarded in such places; but it is most vigorous and spectacular when grown as a tree climber.

Several precautions should be taken when growing the plant as a climber. In a wall situation, particularly on a building, it should be grown on a shaded side. The actual exposure depends on the area, but in the vicinity of Boston it does best with a northerly or northeasterly exposure. If grown in a southern exposure it may be damaged by the winter sun and do very poorly. One should keep in mind that the entire inflorescence is shed as a single unit, usually in early winter, and may present a problem in cleaning up. Planting it against a wall behind existing plantings, such as *Rhododendron* L. and *Enkianthus* Loureiro, should, therefore be avoided. *Hydrangea anomala* climbs, as mentioned previously, by means of secondary rootlets which penetrate the substrate, causing damage apparently no greater than that of other woody climbers. Haworth-Booth suggests growing the species in conjunction with *Tropaeolum speciosum* Poeppig & Endlicher, a spectacular climbing "Nasturtium" with orange-red flowers, an excellent suggestion which applies, unfortunately, only to warm climates or, perhaps, a large greenhouse. An excellent example of wall-grown *Hydrangea anomala*, raised from seed in 1892, may be seen on the northeast corner of the Administration Building in Jamaica Plain.

A tree-grown specimen should be started on a mature tree, for growth will become more vigorous with time. Branches eventually will encircle the tree, although not girdle it, and may even reach the crown of very large specimens. When tree and *Hydrangea* are mature the inflorescences will cover the tree trunk and large secondary branches at flowering time. During the height of flowering, the fertile flowers are worked heavily by honey bees, welcome to some but not to others. A



PLATE V

Close-up of inflorescences of *Hydrangea anomala* subspecies *petiolaris*. Note dissimilarity between the central fertile and peripheral sterile flowers.

fine tree-grown specimen may be seen at 380 South St., adjacent to the Arboretum grounds, in Jamaica Plain.

The future possibilities for this plant rest, I believe, simply in growing it more widely. It is obtainable from many nurserymen, who should not hesitate to recommend it. New introductions probably are in order, even though a large part of the natural range (mainland China) is not open to us at present, for one finds, in the herbarium, specimens with very large sterile flowers (up to 2 inches or more in diameter), with flowers with deckled edges instead of smooth ones, and with orange-green to pinkish flowers. All or any of these variations would be welcome additions to horticulture. Occasionally, a plant with 5-lobed sterile flowers is found, but the condition seems unstable, and 4-lobed flowers may occur on the same plant.

A haploid chromosome number of 18 has been reported by Sax (1931) from cultivated material of *Hydrangea anomala* subsp. *petiolaris*. This is consistent with reports of other members of the genus, excepting the more spectacular clones of *H. paniculata* Siebold, such as 'Pee Gee' which have a haploid number of 36. The beauty of this cultivar is due to the increased number of sterile flowers, suggesting that interesting results might be obtained by raising the chromosomal level of *H. anomala*.

SECTION CORNIDIA

The name CORNIDIA, derived from *cornu*, refers to the horn-like recurved styles in the mature fruit. This section is characterized, in part, by the development of large bracts which enclose the immature inflorescence. These bracts often are colored and add to the general interest of the group. All the plants are evergreen in their native habitat, and all are climbers under proper conditions. Any or all of them could be used in gardens as climbers, either for themselves or as potential breeding stock. In the latter category, it should be noted that hybrids between species are relatively rare in *Hydrangea* and up to now no chromosome counts have been reported for members of this section of the genus. Results of a proper breeding program, even though difficult to obtain, could be well worth the effort. Haworth-Booth has pointed out that it should be possible "... to produce a red-flowered, evergreen, self-clinging climber hardy enough for fairly general use on shaded walls."

The tropics and the temperate regions of the Southern Hemisphere have contributed extraordinarily few plants to the horticulture of the North Temperate Zone. The reasons for this may be obvious for tropical plants, but are much less so for plants originating in the Temperate Zone of the Southern Hemisphere. Indeed, the situation is a real puzzle which probably does not have any simple biological explanation.

All the members of Sect. CORNIDIA are native to the tropics of the South Temperate Zone. I have listed the species (according to McClintock's classification) alphabetically, together with the characters which may be of horticultural importance.

2. ***Hydrangea asterolasia*** Diels, Notizblatt des Botanischen Gartens und Museums zu Berlin-Dahlem. **15:** 370. 1941.

Native in Costa Rica, Panama, Colombia, and Ecuador at elevations of 3600-7500 feet; shrubs or climbers; fertile flowers white; sterile flowers present, about 1 inch in diameter, white; bract color unknown.

I have seen no material referable to this species.

3. ***Hydrangea diplostemonia*** (Donnell Smith) Standley, Journal of the Washington Academy of Sciences. **18:** 160. 1928.

Native in Costa Rica and Colombia, at altitudes of 1800-4500 feet; shrubs or climbers; fertile flowers pink to rose; sterile flowers absent or rarely present; bracts green.

This species is poorly known at this time, but the general lack of sterile flowers is disadvantageous from a horticultural point of view.

4. ***Hydrangea integrifolia*** Hayata, Journal of the Faculty of Science, University of Tokyo. **22:** 131. 1906.

Native in the Philippine Islands and Formosa at high altitudes; strong climbers; fertile flowers white; sterile flowers many, about $1\frac{1}{2}$ inches in diameter; bracts large, but color undetermined.

There is a marked seasonal fluctuation in stem elongation in this species, and the plants might be deciduous under more arduous climatic conditions. It is, however, worthy of further investigation for ornamental use. McClintock has placed it in Sect. CORNIDIA, but I suspect that its proper relationship is with Sect. HYDRANGEA, specifically near *H. involucrata* Siebold.

5. **Hydrangea jelskii** Szyszylowicz, Rozprawy Akademija Umiejetnosciwydzial Matematyczno-Przyrodniczy II. 9: 215. 1895.

Native in Ecuador and Peru at an altitude of about 6000 feet; climbers; fertile flowers white; presence or absence of sterile flowers unknown; bract color unknown.

Known only from two collections, both well past their prime.

6. **Hydrangea mathewsii** Briquet, Annuaire du Conservatoire et du Jardin botaniques de Genève. 20: 413. 1919.

Native in northern Peru; climbers; fertile flowers white; sterile flowers absent; bract color unknown.

Known only from two collections, but because of lack of sterile flowers apparently unworthy of serious consideration as an ornamental plant.

7. **Hydrangea oerstedii** Briquet, Annuaire de Conservatoire et du Jardin botaniques de Genève. 20: 407. 1919.

Native in Costa Rica, Panama, Colombia, Ecuador, and Peru at altitudes of 3600-9000 feet; shrubs to strong climbers; fertile flowers pink to dark magenta; sterile flowers numerous, $\frac{3}{4}$ -1 $\frac{1}{2}$ inches in diameter, pink to dark magenta; bract color pink, becoming greenish with age.

This seems to be the most promising species, of Sect. CORNIDIA, in terms of showiness and should be tried in a southern garden.

8. **Hydrangea peruviana** Moricand in De Candolle, Prodrromus. 4: 14. 1830.

Native of Costa Rica, Panama, Colombia, Ecuador, and Peru, usually at altitudes of 3600-9600 feet; shrubs or climbers; fertile flowers pink; sterile flowers few to many, $\frac{1}{2}$ -1 inch in diameter, pink; bracts pink, becoming greenish with age.

This plant is very closely related to the preceding species, *Hydrangea oerstedii*, and, according to McClintock, the two perhaps may represent forms of a dimorphic species. In my opinion, they may be conspecific, with a tendency toward dioecism (male and female flowers on separate plants) such as one finds in the Hawaiian genus *Broussaisia* Guadichaud. This might prove to be a very valuable ornamental species because of its colorful sterile flowers.

9. **Hydrangea preslii** Briquet, Annuaire du Conservatoire et du Jardin botaniques Genève. 20: 409. 1919.

Native in Costa Rica, Panama, Colombia, Ecuador, and Peru at altitudes of

300-7500 feet; shrubs or climbers; fertile flowers pink to wine-red; sterile flowers absent; bract color unknown.

This species has large inflorescences but always lacks sterile flowers. It might be useful as a stock for breeding towards a large inflorescence.

10. *Hydrangea seemannii* Riley, Kew Bulletin. 1924: 207. 1924.

Native of the Sierra Madre of Durango, Mexico, at altitudes of 6000-7800 feet; strong climbers; fertile flowers white; sterile flowers relatively few, about $1\frac{1}{2}$ inches in diameter and assumed to be white; bract color unknown.

This species is known from only a few collections, and its horticultural value cannot yet be judged.

11. *Hydrangea serratifolia* (Hooker & Arnott) Philippi f., Plantarum Vascularium Chilensium. 97. 1881.

Native in Chile and Argentina at altitudes of 2400-4500 feet; shrubs or robust climbers; fertile flowers white; sterile flowers generally absent but about 1 inch in diameter when present; bract color unknown.

This southernmost *Hydrangea* normally is exposed to the coldest environment of any species of this section. It would seem to be the logical choice of the whole section to grow, and is being cultivated, in Great Britain. Introduced there by H. F. Comber (*Comber 564*) in 1927, it is grown on walls, particularly with a southern exposure, where the temperature may reach 15° F. for short periods, unfortunately, it generally lacks sterile flowers in its large compound inflorescences. According to a personal communication from Edinburgh, the Comber material is unisexual.

12. *Hydrangea steyermarkii* Standley, Publications of the Field Museum, Botanical Series. 22: 233. 1940.

Native in Guatemala at an altitude of 4500-9000 feet; climbers; flowering material unknown. Known only from juvenile plants and one mature fruiting specimen.

13. *Hydrangea tarapotensis* Briquet, Annuaire du Conservatoire et du Jardin botaniques de Genève. 20: 415. 1919.

Native in Colombia, Peru, and Bolivia at altitudes of 2400-4500 feet; shrubs or climbers; fertile flowers creamy white; sterile flowers absent; bract color unknown.

Closely related to *Hydrangea serratifolia* but less likely to be successful in cultivation as it is probably less hardy.

II. SCHIZOPHRAGMA Siebold & Zuccarini

The name *Schizophragma* is derived from Greek *schizo*, to divide, and *phragma* a fence or screen, in allusion to the skeleton-like mature capsules. Unlike cap-



PLATE VI

Wall-grown specimen of *Schizophragma hydrangoides* during flowering period.

sules in most of the Saxifragaceae, these open, not by an apical pore, but by disintegration of the tissue between the calyx ribs. This adaptation apparently is a consequence of the development of fused styles which prevented the normal dehiscence mechanism. Capsules of this type are characteristic of *Schizophragma*, *Decumaria*, and *Pileostegia*.

All of the plants of *Schizophragma*, which I am treating as three species in this paper, are climbers similar to *Hydrangea anomala*. All are deciduous, and in two species there is an interesting development of a single calyx lobe of each sterile flower into an enlarged petaloid structure. This is equivalent to one of the four enlarged calyx lobes of *Hydrangea* or the single enlarged lobes of *Mussaenda* L., *Pseudomussaenda* Wernham, and several other genera of the family Rubiaceae. As in *Hydrangea*, the sterile flowers are the primary source of beauty of the plants.

KEY TO THE SPECIES OF SCHIZOPHRAGMA

- a. Sterile flowers present.
 - b. Leaves coarsely dentate; plants of Japan and Korea. 1. *S. hydrangeoides*
 - b. Leaves entire to sparingly dentate: plants of China, Tibet, and Burma.
 - 2. *S. integrifolium*
- a. Sterile flowers absent; plants of Burma and China. 3. *S. crassum*

1. **Schizophragma hydrangeoides** Siebold & Zuccarini, *Florae Japonicae*. 60. tab. 26. 1835.

At the time of the introduction of *Schizophragma hydrangeoides* into horticulture, it was so often confused with *Hydrangea anomala* that it is not definitely known when it did come into cultivation. In *The Garden* 1879 there is an illustration, but it is hard to be certain whether this was prepared from life. A plant definitely flowered in Great Britain in 1905, but this seems a very late date. Plants of *Schizophragma* and *Hydrangea* were sometimes illustrated together under the latter name, although a few observant growers indicated that two varieties might be represented. In retrospect, it is not difficult to imagine how this confusion came about, for the plants are superficially alike. What is puzzling is the long delay in correcting the error, for casual examination of fertile flowers should have been sufficient, the styles being free in *Hydrangea* but fused in *Schizophragma*. In addition, the mature capsules are quite distinctive.

Known to occur naturally in Japan and Korea, *Schizophragma hydrangeoides* commonly is found as a tree climber, although it also occurs on rocks and sandstone cliffs. Its uses are therefore similar to those noted previously for *Hydrangea anomala*, with the same precautions applicable. It seems to be more difficult to find a location in which the plants will thrive than for the *Hydrangea*. Our best plant at the Arboretum is grown on the northeast-facing wall of the Administration Building, where it is perfectly hardy.

The light-green leaves opening early in the spring, although not as early as those of *Hydrangea anomala*, are quite attractive. They are ovate to heart-shaped



PLATE VII

Close-up of inflorescence of *Schizophragma hydrangoides*. Note striking dissimilarity between the central fertile flowers and peripheral sterile ones.

in outline, with a coarsely dentate margin, and are somewhat reminiscent of the cottonwood leaf. Under proper conditions, the leaf blade may become six inches long and broad. The lateral branches usually grow at right angles to the main climbing shoots and seldom exceed three feet in length. The foliage is oriented towards the light and forms an interesting mosaic. Insect damage appears to be minimal.

The lateral branches also bear the terminal inflorescences, which open in July and August. Seldom exceeding six inches in diameter, each inflorescence is composed of several hundred small fertile flowers and up to a dozen sterile flowers. As in the hydrangeas, the sterile flowers are arranged about the periphery of the inflorescence and are borne on long pedicels. A single calyx lobe of each sterile

flower is enlarged and petaloid. Curiously, the lobe which develops is the one oriented away from the central axis of the inflorescence. In *Schizophragma hydrangeoides*, it is ovate or sometimes lanceolate, $\frac{1}{2}$ to 4 inches long, $\frac{1}{2}$ to 3 inches broad, and white. None of the flowers are shed, and, as a result, the blooming period appears to be quite long. The entire inflorescence is either dropped in early winter or retained as long as the following winter. In this respect, *S. hydrangeoides* is a cleaner plant than *Hydrangea anomala*.

There is no fall coloration, nor are the small laterally dehiscent capsules attractive. The tight bark is dull gray in color and not particularly interesting.

On the basis of herbarium material from wild sources, the species seems to be relatively uniform with very little geographic variation. New selections would have to be made on the basis of individual plants which might have desirable characteristics; for additional introductions, on a broad scale, should not be expected to yield more spectacular plants than those which we now have.

A haploid chromosome number of 14 had been reported by Sax (1931) and others for *Schizophragma hydrangeoides*. On the basis of chromosome number only, two possibly fruitful experiments are suggested. One would be to raise the chromosome level in hopes of obtaining a greater percentage of more robust sterile flowers. The second is to attempt to cross this species with *Decumaria barbara*, of the southeastern United States, to obtain information regarding the relationship of the two genera.

2. ***Schizophragma integrifolium*** Oliver, Hooker's *Icones Plantarum*. 20: tab. 1934. 1890.

This species, *Schizophragma integrifolium*, was introduced into cultivation in Great Britain in 1901 from seed collected the previous year by E. H. Wilson in Hupeh, China. Wilson was also responsible for bringing it into cultivation in this country via the Arnold Arboretum in 1909. The Arboretum's material, collected in Szechuan, presumably has been lost since. This species is not available commercially in this country at present. A voucher specimen (*Wilson 1068*) deposited in the herbarium of the Arnold Arboretum substantiates the identification and the introduction. *Schizophragma integrifolium* has not been grown widely here, perhaps because it is less hardy than *S. hydrangeoides*. It has, however, as an ornamental plant an extraordinary potential which has not yet been realized.

Known in the wild from Formosa, central and south China, *Schizophragma integrifolium* is found generally at high elevations. It sometimes takes the form of a free-standing shrub but most often clammers or climbs over, or up, steep rocky places or trees. The climbing mechanism, again, is by adventitious roots arising from the main climbing stems. The uses and precautions given for *Hydrangea anomala* apply also to this plant.

The growth form of this species is essentially the same as that of *Schizophragma hydrangeoides*. While *S. hydrangeoides* is marked by little variability, *S. integrifo-*

lium is extremely variable in a number of important characteristics such as size, shape, serration of the margin, and pubescence of the leaves; size of inflorescence; and size and shape of sterile flowers.

The light green leaves, darker above than beneath, range in shape from ovate to broadly elliptic. Leaf size varies from $2\frac{1}{2}$ to 8 inches in length, and $1\frac{3}{4}$ to 5 inches in breadth. The margin may be entire, minutely denticulate, or sinuate-dentate. The leaf undersurface varies from glabrous to densely woolly or felted.

The lateral branches bear terminal inflorescences which, with a few exceptions, are much more showy than those of *Schizophragma hydrangeoides*. The inflorescences are at least six inches in diameter but may be up to a full foot across. There are several hundred fertile flowers with a dozen or so sterile flowers arranged about the periphery. A single calyx lobe of each sterile flower is enlarged. It varies from ovate to broadly elliptic in shape, is $\frac{3}{4}$ to $3\frac{1}{4}$ inches long, $\frac{3}{8}$ to 2 inches broad, and yellow to cream or white in color. All flowers are retained on the inflorescence, with the entire structure being shed in early winter to late spring.

There is little fall coloration and the small capsules are unattractive. The bark is an uninteresting dull gray color.

Some readers may realize that the varieties which Rehder described in this species are swamped in the welter of variability which I have mentioned very briefly. On the basis of the material now available, I believe that these varieties lack any distinct biological basis. The varieties must have appeared more distinct to Rehder as he had very few specimens. It is interesting to note that the type specimen of each of his varieties represents almost the extreme expression of a particular variable character.

My general remarks concerning this species may have misled some into believing that this is just another species similar to *Schizophragma hydrangeoides*. This is not my intent, for *Schizophragma integrifolium* is the most spectacular of all the species considered here. It has not been grown much in this country because it is tender and does not over-winter well. It is a magnificent plant that should be introduced into our warmer areas.

At this time, it is impossible to make additional selections from native plants, but if it were, the prime area for source material would be Szechuan Province, in western China. The plants in this particular province show tremendous variability in all characteristics and would be a breeder's delight. However, all of the material in cultivation in Europe, is not the result of a single introduction, so that a breeding program could be devised and based on available materials. A diploid chromosome number of 72 has been reported by Hamel (1953) for *S. integrifolium*, a number which is especially interesting in light of the diploid count of 28 for *Schizophragma hydrangeoides*.

3. **Schizophragma crassum** Handel-Mazzetti, Anzeiger der Kaiserlichen Akademie der Wissenschaften, Wien, Mathematisch-Naturwissenschaftliche Klasse. 59: 247. 1922.

This species is native in southwestern China and Burma and is readily distinguished from others of the genus by the lack of sterile flowers. It is, however, strikingly similar in gross morphological characters to *Schizophragma integrifolium* and may represent only another extreme in variation of that diverse species. This is a question which I hope to clarify in the near future. To the best of my knowledge, it has never been in cultivation nor, because of the lack of sterile flowers, does there seem to be any future for it.

III. DECUMARIA L.

The name *Decumaria*, is derived from Latin *decimarius*, relating to tenths, an allusion to the often 10-parted flowers. Today, such a derivation may seem tenuous, but the classification of Linnaeus was based upon his so-called "sexual system" which system rested primarily on the number of parts in the flower. The species of this genus are woody deciduous climbers having fertile flowers with 7-10 petals, and 20-30 stamens, and lacking sterile flowers. Only two species are known, one from the southeastern United States, the other from China.

KEY TO THE SPECIES OF DECUMARIA

- a. Leaves deciduous; leaf blade ovate to elliptic, $1\frac{1}{2}$ -4 $\frac{3}{4}$ inches long, 1-3 $\frac{1}{2}$ inches broad, the apex acute, abruptly short-acuminate, or rarely obtuse; stigma borne on a well-developed stylar column; plants of the southeastern United States. 1. *D. barbara*
- a. Leaves persistent or semipersistent; leaf blade elliptic to oblanceolate, $1\frac{1}{4}$ -2 $\frac{3}{4}$ inches long, $\frac{1}{2}$ -1 inch broad, the apex obtuse; stigma sessile; plants of China. 2. *D. sinensis*

1. *Decumaria barbara* L. Species Plantarum ed. 2. 1663. 1763.

This species has a tangled background of considerable interest, but I am not prepared to explain fully all of the more interesting aspects. It was described by Linnaeus in 1763, from a specimen grown in the botanic garden at Uppsala, Sweden. Linnaeus was the first to apply a binomial name to the plant, although it was known from earlier works in which it was believed to be a *Clusia* (family Guttiferae). Linnaeus apparently lost track of, or never knew the origin of this particular material, for his specific epithet *barbara* indicates the native origin as the Barbary Coast. He says "*Habitat an in Africa?*" Thus, it joins a host of other plant species first described from material in cultivation, and like so many of them there is some doubt about its original source. Rehder gives the date of introduction into cultivation in this country, as 1785.

This species, *Decumaria barbara*, is found as a tree climber and rock climber in very moist habitats in Louisiana, Mississippi, Alabama, Tennessee, Florida, Georgia, North and South Carolina, and Virginia where it is sometimes known as "wood vamp." The inflorescences of fragrant, white, fertile flowers are relatively small (generally about three inches in diameter). The flowering period

lasts several weeks; with the time of flowering, varying geographically, from April 1 through early June.

In this country, these plants have been cultivated primarily as a greenhouse curiosity. There is no question that they are not as showy as either *Hydrangea anomala* or *Schizophragma hydrangeoides*. I have no information, however, concerning their heat tolerance, and they may prove unsatisfactory in the south. The use of *Decumaria barbara* may also be restricted in the south because of its high water requirements. If these can be met, however, the plants are handsome enough to warrant growing them. If, however, these same plants are grown farther north the water requirement is not critical. Plants of *D. barbara* grown out of doors in this area have not proven winter hardy, but new selections from Georgia (particularly Lumpkin, Rabun, and Habersham counties) might be sturdier.

Sax (1931) has recorded a meiotic chromosome number of 14 for this species. Two interesting experiments listed under *Schizophragma hydrangeoides* are also applicable here.

2. *Decumaria sinensis* Oliver, Hooker's Icones Plantarum. 18: tab. 1741. 1888.

Native in Honan, Hupeh, and Szechuan provinces of China, this species is similar to the preceding but has shorter and narrower persistent leaves. The plants tend to be less robust and so have denser foliage than *D. barbara*. As in the latter species, the small inflorescences lack sterile flowers, a character partially offset by its evergreen or semi-deciduous nature. This characteristic would be of some importance in considering the species for cultivation in our southern states.

This species is grown out of doors as a wall climber in the Royal Botanic Gardens, Kew, where it seems to be perfectly hardy. It is also grown in other gardens of western Europe, flowering in late May. The Arboretum grew this species many years ago, as a pit-house plant. Our plants, the first introduction in the United States, were grown from seed collected by Wilson in China, in 1908. So far as I know this species is no longer available in this country.

IV. *PILEOSTEGIA* Hooker f. & Thomson

The name *Pileostegia* is derived from *pilos*, meaning cap, and *stegnus*, meaning drawn together, probably in allusion to the petals, which are fused into a cap-like structure. This petal cap falls as a unit when the fertile flowers open. The plants are evergreen with elliptic, leathery leaves with petioles very much shorter than the leaf blades. The resulting leaf mosaic is unlike that formed by the plants described previously. The relatively large inflorescences are composed entirely of fertile flowers and, therefore, not as showy as they might be. Except for minor differences in size and shape, the fruiting capsules are of the same type as in *Schizophragma* and *Decumaria*.

The evergreen nature of these plants may limit their use in cold-temperate areas such as ours, but they could be extremely useful in our warmer climates. I believe the water requirements would prove to be less difficult to meet than those of our native *Decumaria barbara*.

KEY TO THE SPECIES OF PILEOSTEGIA

- a. Lower leaf surface smooth (glabrous); plants of India, China, Formosa, Hong Kong, and the Ryukyu Archipelago. 1. *P. viburnoides*
- a. Lower leaf surface with rust-colored stellate hairs; plants of southeastern China. 2. *P. tomentella*

1. ***Pileostegia viburnoides*** Hooker f. & Thomson, Journal of the Linnean Society of London. Botany. 2: 57, 58, 76, tab. 2. 1858.

Tree and rock climbers of relatively small stature, native to India, China (Anhwei, Chekiang, Fukien, Hunan, Hupeh, Kiangsi, Kwangsi, Kwantung, Kweichow, Szechuan, and Yunnan provinces), Formosa, Hong Kong, and reported from the Ryukyu Archipelago. The leaves are elliptic in shape, glabrous, dark-green above, and light-green beneath. The margin is entire or sometimes slightly serrate. It is of interest that the plant described to establish the genus was thought at first, to be a holly (*Ilex*) because of the leaf shape. Some years later, the reverse confusion occurred when a plant from Mexico described as a *Pileostegia*, later had to be transferred to *Ilex*. The fertile white flowers are borne on huge inflorescences (up to seven inches long, and eleven inches in diameter)! The floral odor is described either as "fragrant" or "ill smelling." The flowering period, in the native habitats, seems to be in August.

This species was introduced into cultivation by E. H. Wilson, in 1908. At present it is grown as an ornamental in western Europe and in southern California where it is employed as a wall climber. It is not available commercially in this country.

2. ***Pileostegia tomentella*** Handel-Mazzetti, Anzeiger der Kaiserlichen Akademie des Wissenschaften, Wien, Mathematisch-Naturwissenschaftliche Klasse. 59: 55. 1922.

Tree and rock climbers, of small stature, occurring wild in Fukien, Hainan, Kiangsi, Kwangsi, and Kwangtung provinces of China. The oblong or elliptic leaves are somewhat bicolorous because of the rust-colored, stellate hairs on the lower surface. The fertile, fragrant, white flowers are borne on large inflorescences (to eight inches long and eleven inches in diameter) in September and October. The small fruiting capsules generally are yellow, although I have seen one report of black.

This plant has tremendous possibilities as an ornamental because of the interesting evergreen leaves and very large inflorescences. The most advantageous characteristic, however, the late flowering period, would greatly improve its po-

tential. It seems to be limited in its cold tolerance and may be satisfactory only under warm conditions. I do not believe it is available at the present.

Acknowledgements

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Name Finding List

Names in **bold face** type are names accepted here as correct and used in the text. Names in *italics* are considered synonyms and each is followed by its accepted equivalent. Names of authorities appear in roman type. Generic names are abbreviated (**D.**=**Decumaria**; **H.**=**Hydrangea**; **P.**=**Pileostegia**; **S.**=**Schizophragma**).

Cornidia

integerrima Hooker & Arnott=**H. serratifolia**
peruviana (Moricand) Small=**H. peruviana**
radiata Oersted=**H. oerstedii**
serratifolia Hooker & Arnott=**H. serratifolia**
umbellata Ruiz & Pavon=**H. preslii**

Decumaria

barbara L.
forsythia Michaux=**D. barbara**
prostrata Loddiges ex Loudon=**D. barbara**
radicans Moench=**D. barbara**
sarmentosa Bosc=**D. barbara**
scandens (Walter) Salisbury=**D. barbara**
sinensis Oliver

Forsythia

scandens Walter=**D. barbara**

Gilibertia

diplostemonia Donnell Smith=**H. diplostemonia**

Hydrangea

altissima Wallich=**H. anomala** subsp. **anomala**
anomala D. Don subsp. **anomala**
anomala D. Don subsp. **petiolaris** (Siebold & Zuccarini) McClintock
antioquiensis Engler=**H. tarapotensis**
asterolasia Diels
bangii Engler=**H. tarapotensis**
bracteata Siebold & Zuccarini=**H. anomala** subsp. **petiolaris**
briquetii Engler=**H. preslii**
caucana Engler=**H. peruviana**
cordifolia Siebold & Zuccarini=**H. anomala** subsp. **petiolaris**
cuneatifolia Elmer=**H. integrifolia**
diplostemonia (Donnell Smith) Standley

durifolia Briquet = **H. oerstedii**
ecuadorensis Briquet = **H. preslii**
epiphytica Morton ex Haworth-Booth = **H. asterolasia**
glabra Hayata = **H. anomala** subsp. **petiolaris**
glandulosa Elmer = **H. integrifolia**
goudotii Briquet = **H. oerstedii**
integra Hayata = **H. integrifolia**
inornata Standley = **H. diplostemona**
integerrima (Hooker & Arnott) Engler = **H. serratifolia**
integrifolia Hayata
jelskii Szyszylowicz
lehmannii Engler = **H. peruviana**
mathewsii Briquet
oerstedii Briquet
panamensis Standley = **H. peruviana**
peruviana Moricand
petiolaris Siebold & Zuccarini = **H. anomala** subsp. **petiolaris**
petiolaris Siebold & Zuccarini γ . *bracteata* (Siebold & Zuccarini) Franchet & Savatier =
H. anomala subsp. **petiolaris**
petiolaris Siebold & Zuccarini β . *cordifolia* (Siebold & Zuccarini) Franchet & Savatier =
H. anomala subsp. **petiolaris**
petiolaris Siebold & Zuccarini var. *cordifolia* Maximowicz forma *formosana* Miyushima =
H. anomala subsp. **petiolaris**
petiolaris Siebold & Zuccarini α . *ovalifolia* Franchet & Savatier = **H. anomala** subsp.
petiolaris
platyphylla Briquet = **H. oerstedii**
preslii Briquet
scandens Maximowicz = **H. anomala** subsp. **petiolaris**
scandens Poeppig = **H. serratifolia**
scandens Maximowicz β . *cordifolia* Maximowicz = **H. anomala** subsp. **petiolaris**
scandens Maximowicz α . *petiolaris* Maximowicz = **H. anomala** subsp. **petiolaris**
schlimii Briquet = **H. oerstedii**
seemannii Riley
serratifolia (Hooker & Arnott) Philippi f.
sprucei Briquet = **H. diplostemona**
steyermarkii Standley
taquetii Lèveillé = **S. hydrangeoides**
tarapotensis Briquet
tilaefolia Lèveillé = **H. anomala** subsp. **petiolaris**
 trianae Briquet = **H. peruviana**
umbellata (Ruiz & Pavon) Briquet = **H. preslii**
volubilis Hort. ex Rehder = **H. anomala** subsp. **petiolaris**
weberbaueri Engler = **H. peruviana**

Pileostegia

obtusifolia (Hu) Hu = **D. sinensis**
tomentella Handel-Mazzetti
urceolata Hayata = **P. viburnoides**
viburnoides Hooker f. & Thomson
viburnoides Hooker f. & Thomson var. *parviflora* Oliver ex Maximowicz = **P. viburnoides**

Sarcostyles

peruviana Presl = **H. preslii**

Schizophragma

crassum Handel-Mazzetti

crassum Handel-Mazzetti var. *elliptica* Anthony = **S. crassum**

fauriei Hayata = **S. integrifolium**

hydrangeoides Siebold & Zuccarini

hydrangeoides Siebold & Zuccarini var. *formosa* Nakai = **S. hydrangeoides**

hydrangeoides Siebold & Zuccarini var. *integrifolium* Franchet = **S. integrifolium**

hypoglaucum Rehder = **S. integrifolium**

integrifolium Oliver

integrifolium Oliver var. *denticulatum* Rehder = **S. integrifolium**

integrifolium Oliver var. *fauriei* Hayata = **S. integrifolium**

integrifolium Oliver var. *glaucescens* Rehder = **S. integrifolium**

integrifolium Oliver var. *minus* Rehder = **S. integrifolium**

integrifolium Oliver var. *molle* Rehder = **S. integrifolium**

obtusifolium Hu = **D. sinensis**

tomentellum (Handel-Mazzetti) Stapf = **P. tomentella**

viburnoides (Hooker f. & Thomson) Stapf = **P. viburnoides**

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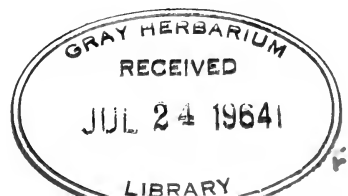
REGISTRATION OF CULTIVAR NAMES IN ULMUS

P. S. GREEN

THE COMPILATION OF A LIST OF CULTIVAR names in *Ulmus* has proved more complex than might at first have been expected. One of the primary reasons for this is that within the genus there is no unanimity of opinion over the delimitation of species or the extent of spontaneous hybridization. However, several species have been in cultivation for centuries and, within these, numerous varieties have arisen. This contrasts with the situation in *Fagus*, the subject of the most recent registration list to be published (*Arnoldia* 24 (1): 1-8. 1964) where only one species was involved and where there were no problems of specific identity; in *Ulmus* the identity of cultivars is often masked by confused synonymy at the specific level.

The list of names which follows is primarily bibliographic in nature, giving reference to the first place of publication that has been discovered for each name. Ideally, perhaps, its formation should have gone hand in hand with attempts to find and study authentic material of each clone so that correct specific identities could have been ascertained and many questions of synonymy resolved. However, it was never intended that the compilation should be accompanied by a taxonomic revision of the genus *Ulmus*, and it must be stressed that the list, as published, is almost completely based on the literature and not on the plants themselves. That it may be dangerous to include taxonomic opinions in a purely bibliographic list of names is illustrated by the misleading attempts to include synonymy in the first volumes and supplements of the *Index Kewensis*. Nevertheless, in drawing up this list of names in *Ulmus*, evidence of synonymy and specific identity has often come to hand and it would be wrong not to mention it for the benefit of other workers. It should be understood, however, that such information is given

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solely as a guide and is only very occasionally based on the sure evidence of authentic material. In a few cases there appear to be conflicting opinions as to the correct species to which a particular clone belongs, but, fortunately, with the names of cultivars all that is essential is the name of the genus followed by that of the clone, e.g. *Ulmus* 'Acutifolia' (or elm 'Acutifolia'), to take the first name in the list below. In this way, therefore, the few examples of conflicting identities cited in the text that follows may be referred to as *Ulmus* 'Argenteo-marginata', *U.* 'Christine Buisman', *U.* 'Klemmer' and *U.* 'Lombartsii', or, where the species is uncertain because of juvenile or other atypical foliage, as *Ulmus* 'Myrtifolia' and *U.* 'Nana'.

Where reliable information on identity or synonymy is given it is often attributable to two correspondents to whom I would like to express my most sincere and grateful thanks. Dr. R. Melville, of the Royal Botanic Gardens at Kew, has given me much help and has kindly looked over an early draft of the registration list. In many cases he has examined material in the Nicholson Herbarium at Kew and has personal knowledge of the living trees. Much of the evidence of his help will be seen here and there in the list, in the comments after various names. To Mr. H. M. Heijbroek, of the Stichting Bosbouwproefstation 'De Dorschkamp', Baarn, Netherlands, I am likewise greatly indebted. To him I also sent an early draft of the list and from him received many wise comments, several additional names and much information concerning the elms of the Netherlands and adjoining regions. Though this list would have been considerably poorer without the help of Mr. Heijbroek and Dr. Melville, any mistakes, errors, and omissions are attributable to me and the responsibility for the opinions expressed is mine alone. I should also like to take the opportunity to thank numerous nurserymen and other correspondents who have cooperated and helped with information about the origin of various cultivars and the publication of their names, together with the provision, in many cases, of living plants or specimens. These correspondents are too numerous to mention personally but the nurseries they represent are often cited in the list which follows and my appreciative thanks is expressed to them all.

The taxonomy of *Ulmus* is far from simple and there is no general unanimity over the correct botanical names. Dr. Melville, of Kew, has studied the genus for many years, especially in Britain, where the situation appears to be most complex, and a number of papers have presented some of the conclusions he has reached. However, these conclusions are still being debated by other botanists and the resultant lack of agreement, while it does not affect the names of cultivars, does mean that the nomenclature of the species to which they may be attributed is unstable. In an attempt to overcome this difficulty I have endeavored, wherever a name used by Melville is different from that given by Rehder in his *Manual of Cultivated Trees & Shrubs* (ed. 2, 1940) to give both names as equivalent synonyms. In this way it is hoped that cultivars can be placed in their botanical species correctly, whether the more revolutionary classification of Melville is followed or the widely known arrangement as published by Rehder.

Because of the frequent difficulty in ascertaining positively the species to

which a cultivar should be assigned, it has been deemed advisable in this list to arrange the names in one single alphabetical series. Previous registration lists published in this journal (with the exception of that of *Fagus*) have listed the species alphabetically with the appropriate cultivars arranged under each specific name. In the list which follows the specific identity, or suggested identity, is given (in *italic type*) at the end of the paragraph which follows each accepted name. Such accepted names are printed in LARGE and SMALL CAPITALS, while synonyms are listed in Roman type, followed after the bibliographic reference, by an indication of the name to which it is believed it should be applied.

In the majority of cases only a single reference is given after each name: that of the first printed publication of the name that has been discovered; but where this was not accompanied by a description, the first reference is followed in the list by a second, indicating where the first description was provided. Most of the names in the list are in Latin form, governable by the International Code of Botanical Nomenclature, but more recently, and in a relatively few cases, some of these Latin names have been formally proposed at the rank of cultivar; where this has also been done, additional reference is given to the first such publication.

It has been the experience of colleagues compiling registration lists of cultivars that each new list raises problems which have not previously been apparent. This elm list is no exception and a point which has first arisen with this list is the realization that the word "hybrid" is unsuitable as part of a cultivar name. Article 21 of the International Code of Nomenclature for Cultivated Plants (1961) makes it inadmissible to include the words "variety" and "form" in new cultivar names. To this article should be added the word "hybrid" (see 'Broadleaf Hybrid' in the list below) and a proposal to this effect has been made to the Secretary of the International Commission for the Nomenclature of Cultivated Plants, for consideration when amendments to the Code are next discussed. In addition to this, it has seemed to me, that as cultivar names may correctly be associated with generic names and in either Latin or a modern language, it is inadvisable to include the actual name of the genus in any new name. The name 'Huntingdon Elm' was formally proposed in 1961 but when cited as "elm 'Huntingdon Elm'" we have a mild tautonym; the word "Huntingdon" alone would have been preferable. It is doubtful whether a formal proposal for the amendment of the Code is necessary to guard against this, for Article 21a may possibly be interpreted as preventing such tautonymy, even though it is clear that the intention of the article was to outlaw the inclusion of names of other genera in those of a cultivar.

Another point which has arisen in the compilation of this list is the problem of Latin names proposed in the ablative case. The International Code of Nomenclature for Cultivated Plants has a starting date earlier than that of the Botanical Code: that of the sixth edition of Philip Miller's *The Gardeners Dictionary*, 1752. Several names (e.g. *eleganter variegato*) have been taken from that work for inclusion in this list but the nomenclature is not binomial and the names take the form of descriptive phrases. However, the use of the ablative case in Latin names did not end with the establishment of binomial nomenclature, but,

especially for varieties based on leaf color, continued throughout the 19th century. In this list the liberty has been taken to make these names agree grammatically with the generic name *Ulmus*. Authority is given in the Code for Cultivated Plants (Art. 16) to correct names in Latin form which are not in accordance with the Rules and Recommendations of the Botanical Code and although the case of names in the ablative is not cited, the article is considered as granting authority for such changes.

It has several times proved difficult to decide what actually constitutes a name intended for what is today called a cultivar. *Ulmus* 'Modiolina' was referred to as "Torme tortillard" by Duhamel du Monceau as early as 1804 (Traité Arb. Arbust. ed. 2. 2: 144). Should 'Tortillard', therefore, have been listed below, or is it Duhamel's descriptive "common" name, comparable to the name "Fernleaf Elm" (*Ulmus* 'Crispa')? Similar in some ways are the numerous specimen trees which have been given individual names from time to time, usually based on those of the places or family estates in which they were growing, but often named for their historic associations. This is particularly true of several fine examples of *U. americana* in the eastern U.S.A. but it is believed that because they have been propagated clonally, only two have warranted inclusion in this list ('Markham' and 'Washington'). It is interesting to note that these two are not distinguished by any special morphological characteristics and that they are distinct solely by virtue of the place where they were originally growing.

In contrast to this there are almost certainly a number of cultivars which have never been named. This was pointed out to me by Mr. Heijbroek, for elms have been propagated and grown as roadside trees in the Netherlands and Flanders for many centuries. Many of these clones have received names which have been published, e.g. 'Klemmer' and 'Malines', but there are others as yet unnamed and unlisted. In one case, that of 'Schoorhoek', one of these nameless clones has been retaken into cultivation relatively recently and named.

Decisions about the synonymy of the many cultivars distinguished by their leaf variation or habit of growth have been very difficult to reach. It is possible that at different times more than one clone has been known by the same name and during the last two hundred years or so very similar sports may have arisen more than once in each species. Any information which will help clarify the identity of these plants will be most welcome.

According to the International Code of Nomenclature for Cultivated Plants, a particular name can be correct for only one cultivar, and, if it has been given to more than one, the other usages must be treated as synonyms. In the list that follows it will be readily seen that certain names have been used over and over again for different clones (for example 'Pendula' has been proposed eight times). Fortunately the Code for Cultivated Plants does not bind one rigidly to a rule of priority, as does the Botanical Code, and by the selection of a later well known name it has often been possible to reduce the duplication of acceptable names. However, in other cases this has proved impossible. The obvious way out would be to propose new names to replace the duplicates, but there is a chance that some of the clones no longer exist and such names would then be superfluous.

It is believed that it would be wrong, in a bibliographic compilation such as this, to propose new names, either because the plants may no longer be in cultivation anywhere or because the study of living material may yet show that some of the duplicate names are in fact synonyms of others which are unambiguous. For the present at least all that is necessary for precision is the citation of the name of the species as well as that of the genus. Whenever possible in this registration list alternative names have been chosen to reduce synonymy but in the following eight cases this has proved impracticable. 'Argenteo-variegata' is a well known name in *Ulmus procera*, but amongst other plants it has also been used as the name for a white-variegated form which is probably assignable to *U. × viminalis*, yet is possibly no longer in cultivation. 'Aurea' is also known as the name for a cultivar of *U. procera*, and is one of the relatively few that have been formally proposed as such at this rank, but it clashes with a variety of *U. americana* which has no synonym and may not be in cultivation today. 'Aureo-variegata' has been used for clones in three different species (*U. × hollandica*, *U. laevis* and *U. × viminalis*) and for all three there are no published synonyms. With the name 'Pendula' the duplication has been reduced in most cases by taking up synonyms, but in both *U. carpinifolia* and *U. pumila*, 'Pendula' has been formally proposed as a cultivar name and in neither case is there a known synonym. Similarly there are no known alternatives for 'Pyramidalis' of either Audibert or Gibbs, although the identity of the former is somewhat dubious. In 'Rugosa' two authorities and references are listed below but there is possible doubt about their distinctness, the published descriptions being hardly diagnostic. Lastly, in 'Variegata', although the name has been proposed some seven different times, five of them are disposed of as synonyms of other names, but of the two which remain, one is little known and perhaps misidentified as to species in this list, whilst the other may well have been used at different times for more than one clone of *U. carpinifolia*.

Many names have been considered for inclusion and rejected on the grounds that either the botanical rank of *varietas* is most appropriate or because the plants have never been in cultivation. All authorities list *Ulmus pumila* L. var. *arborea* Litvinov (*U. pinnato-ramosa* Dieck) as a botanical variety yet it is possible that, in modern terms, it does not warrant recognition at this rank but is a variant of *U. pumila* maintained and known only in cultivation, and therefore best treated as a cultivar. There is a widespread misunderstanding that all cultivars must have arisen in cultivation. It is agreed that this is true in the vast majority of cases, but all that is required for recognition as a cultivar is that the plant be under cultivation, unsuitable for treatment at any of the taxonomic ranks under the Botanical Code, yet in need of a distinctive name.

Finally, some comment should be made about the inclusion of the epithets *fungosa* and *suberosa* in the list. The development of corky wings on branches is a juvenile character which has appeared in different individual plants of *Ulmus carpinifolia* and other related elms. There is no doubt that the name *suberosa* has been applied to cultivated clones, but not always to the same one. As a name it should be dropped from use, except perhaps at the botanical rank of *forma*, yet even there it is hardly appropriate. The corky wings may be exhibited

by sucker shoots throughout the life of the plant yet they are still primarily a juvenile character and as such are comparable with the *Retinospora*-forms of conifers.

A list of this size and type can hardly be compiled without some errors and misinterpretations, and for this reason any comments, corrections or additions will be gratefully received. It is hoped, however, that this registration list will help towards nomenclatural stability for the numerous cultivated varieties and at the very least, will aid in preventing future duplication.

BOTANICAL NAMES AND THEIR AUTHORITIES REFERRED TO IN THE REGISTRATION LIST

Ulmus americana L.

U. angustifolia (Weston) Weston var. *cornubiensis* (Weston) Melville (*U. carpinifolia* Gled. var. *cornubiensis* (Weston) Rehder)

U. carpinifolia Gleditsch

U. × *elegantissima* Horwood (*U. glabra* Huds. × *plotii* Druce)

U. glabra Hudson

U. × *hollandica* Miller (*U. carpinifolia* Gled. × *glabra* Huds. × *plotii* Druce)

U. laevis Pallas

U. parvifolia Jacquin

U. procera Salisbury

U. pumila L.

U. rubra Muhlenberg

U. × *sarniensis* (Loudon) Bancroft (*U. angustifolia* (West.) West. × *hollandica* Mill.)

(*U. carpinifolia* Gled. forma *sarniensis* (Loud.) Rehd.)

U. × *vegeta* (Loud.) Lindley (*U. carpinifolia* Gled. × *glabra* Huds.)

(*U.* × *hollandica* Mill. var. *vegeta* (Loud.) Rehd.)

U. × *viminalis* Loddiges (*U. carpinifolia* Gled. × *plotii* Druce)

(*U. procera* Salisb. var. *viminalis* (Lodd.) Rehd.)

REGISTRATION LIST OF CULTIVARS IN ULMUS

'ACUTIFOLIA' (Masters, Hort. Duroverni 66. 1831, as *U. campestris acutifolia*, without description; Mottet in Nicholson & Mottet, Dict. Prat. Hort. 5: 383. 1898. Described as having the leaves of mature trees narrower and the branches more pendulous. *U. procera*.

- '*Adiantifolia*' (Kirchner in Petzold & Kirchner, Arb. Muscav. 563. 1864, as *U. adiantifolia* Hort., name in synonymy) = '*CRISPA*'.
- '*ALATA*' (Kirchner in Petzold & Kirchner, Arb. Muscav. 566. 1864, as "*U. montana alata*," without description). Possibly a juvenile form of *U. carpinifolia*, (see under *suberosa*).
- '*ALBA*' (Kirchner in Petzold & Kirchner, Arb. Muscav. 559. 1864, as *U. fulva* Hort. var. *alba* Hort., without description). A specimen in Herb. Nicholson at Kew has been identified by Dr. Melville as a rather broad leaved *U. × vegeta* (that is *U. × hollandica* var. *vegeta* sensu Rehder).
- '*Alba*' (Plant Buyer's Guide, ed. 6. 286. 1958, as *U. carpinifolia sarniensis alba*). Mistake for *sarniensis aurea* = '*DICKSONII*'.
- '*ALBO-DENTATA*' (Baudriller, Angers, France, Cat. 43, p. 117. 1880, as *U. microphylla foliis albo-dentatis*, without description). Called the small-leaved elm with silver teeth. Later described as a small tree, the leaves with white margins and spots. *U. carpinifolia*.
- '*ALBO-VARIEGATA*' (Weston, Bot. Univ. 1: 315. 1770, as *U. glabra* var. *albo-varieg.*). Described as having leaves striped with white. *U. glabra*.
- '*Albo-variegata*' (Weston, Bot. Univ. 1: 315. 1770, as *U. hollandica* var. *albo-varieg.*) = '*ELEGANTO-VARIEGATA*'.
- '*ALKSUTH*' (Dieck, Zöschen, Germany, Haupt-Cat. 1885, p. 81, as *U. scabra forma von Alksuth* Hort.). Described as having acute-rounded leaves with a number of, sometimes almost thread-like, teeth. Possibly *U. carpinifolia*.
- '*AMPLIFOLIA*' (Meded. Comité Best. Bestr. Iepen. 10: 9. 1932, as *U. foliacea* var. *amplifolia* [not seen]). Received from Hesse's Nurseries, Weener, Germany, and said to have very short internodes with crowded leaves. *U. carpinifolia*.
- '*ANDROSSOWII*' (Litvinov in Sched. Herb. Fl. Ross. 8: 23, no. 2445. t. 2. 1922, as *U. Androssowi*). Described as having a very dense spherical crown and pubescent leaves. Used as a street tree in Samarkand in 1913. According to Lozina-Lozinskaia (in Sokolov, Trees & Shrubs in the U.S.S.R. [in Russian] 2: 506. 1951) unknown in the wild and apparently a hybrid between *U. densa* and *U. pumila*.
- '*ANGUSTIFOLIA*' (Weston, Bot. Univ. 1: 315. 1770, as *U. hollandica* var. *angustifolia*). Described as having narrow leaves. *U. × hollandica*.
- '*ANSALONI*' (Ansalmi Nurseries, Bologna, Italy, Cat. 1935, p. 23, as "*Olmo Siberiano Ansalmi*"). Said to have been introduced from the Far East about 1930 and to be a quick growing variant with a compact crown which holds its leaves well into the autumn. *U. pumila*.
- '*Antarctica*' (Kirchner in Petzold & Kirchner, Arb. Muscav. 551. 1864, as *U. antarctica* Hort.) = '*VIMINALIS*'.

- 'Antarctica Aurea' (Hartwig, Ill. Gehölzb. ed. 2. 391. 1892, as *U. campestris* var. *antarctica aurea* A.M.). Described as a golden-colored 'Antarctica', = 'AUREA'.
- 'Antarctica Pendula' (Hartwig, Ill. Gehölzb. ed. 2. 391. 1892, as *U. campestris* var. *antarctica pendula* Hort.). Described as the pendulous 'Antarctica', = 'VIMINALIS'?
- 'Argentea' (Bean, Kew Hand-List Trees & Shrubs, ed. 3. 275. 1925, as *U. viminalis* var. *argentea*, without description). = 'VIMINALIS MARGINATA'.
- 'Argenteo-maculata' (Audibert, Tonelle, France, Cat. 1817, p. 23, as *U. campestris* var. *argenteo-maculata*, without description). Referred to as the striped elm. = *U. procera* 'ARGENTEO-VARIEGATA'?
- 'ARGENTEO-MARGINATA' (Deegen in Deutsch. Mag. Gart. Blumenk. 1879: 60. pl. 1879, as *U. campestris elegans argenteo-marginatis*). Described as having the leaves bordered with white, and in a later reference, as rather strongly rough, weakly hairy below, measuring 6-8 by 3-4 cm. *U. carpinifolia* or, possibly, *U. × hollandica*.
- 'Argenteo-marmorata' (Schelle in Beissner et al., Handb. Laubh.-Benenn. 83. 1903, as *U. campestris argenteo-marmorata* Hort., without description) = 'MARMORATA'.
- 'ARGENTEO-VARIEGATA' (Weston, Bot. Univ. 1: 314. 1770, as *U. campestris argenteo-var.*; Krüssmann in Parey's Blumengärtn. ed. 2. 1: 519. 1958, as a cv.). Said to have originated in England by 1677 and to have leaves striped and spotted with white. *U. procera*.
- 'ARGENTEO-VARIEGATA' (Weston, Bot. Univ. 1: 314. 1770, as *U. campestris* var. *angustifolia argenteo-var.*). Described as the silver-striped, narrow-rough-leaved Elm. Probably a cultivar of *U. × viminalis* (*U. carpinifolia* × *plotii*, that is *U. procera* var. *viminalis* sensu Rehder) and then possibly = 'VIMINALIS MARGINATA'.
- 'Argenteo-variegata' (Bean, Kew Hand-List Trees & Shrubs, ed. 3. 273. 1925, as *U. nitens* var. *argenteo-variegata*, without description) = *U. carpinifolia* 'VARIEGATA'.
- 'Argenteo-variegata' (Weston, Fl. Angl. 46. 1775, as *U. glabra* var. *argenteo-variegata*) = *U. glabra* 'ALBO-VARIEGATA'.
- 'Argenteo-variegata' (Weston, Fl. Angl. 46. 1775, as *U. belgica* var. *argenteo-variegata*) = 'ELEGANTO-VARIEGATA'.
- 'ASCENDENS' (Slavin, Am. Midl. Nat. 12: 225. 1931, as a form). Lateral branches small and fastigate, forming a narrow oval head. Name given originally to a tree growing, in 1927, in Seneca Park, Rochester, New York. *U. americana*.
- 'ASPERA' (Loddiges, Hackney, London, Cat. 1823, p. 35, as *U. stricta aspera*, without description). Possibly *U. procera*.

- 'Asplenifolia' (Rehder in Bailey, Cycl. Amer. Hort. (4): 1881. 1902, as *U. asplenifolia* Hort., in synonymy) = 'CRISPA'.
- 'ATROPURPUREA' (Späth, Berlin, Germany, Cat. 55, p. 2. 1882, as *U. montana atropurpurea*; Boom, Ned. Dendr. 1: 157. 1959, as a cv.). Said to have dark purple, folded leaves, and to have originated in Germany about 1881. *U. glabra*.
- 'AUGUSTINE' (Proc. Am. Assoc. Nurserymen 174. 1951 [Woody Plant Register No. 267]). Originated by selection at Bloomington, Illinois, in 1927. Described elsewhere as differing most strikingly in its fastigiate habit, more vigorous growth, stouter twigs and larger, more deeply toothed leaves. *U. americana*.
- 'Augustine Ascending' (Weston in Horticulture, II. 30: 448. 1952) = 'AUGUSTINE'.
- 'AUREA' (Temple ex Rehder in Bailey, Cycl. Amer. Hort. (4): 1880. 1902, as a var.). Described as having yellow foliage and originally found in Vermont by F. L. Temple. *U. americana*.
- 'AUREA' (Morren in Belg. Hort. 16: 356. t. 19. 1866, as *U. campestris* var. *aurea*; Krüssmann in Parey's Blumengärtn. ed. 2. 1: 519. 1958, as a cv.). Described as having golden-yellow leaves, occasionally approaching bronze, branchlets drooping. Originated by Mr. Egide Rosseels at Loewen in Belgium about the middle of the last century. *U. × viminalis* (that is *U. procera* var. *viminalis* sensu Rehder).
- 'Aurea' (Hillier and Sons, Winchester, England, Cat. Autumn 1914 – Spring 1915, p. 24, as *U. campestris sarniensis aurea*). Dickson's Golden Elm = 'DICKSONII'.
- 'Aurea Roetzlii' (James Dickson, Chester, England, Cat. 340, p. 38. 1887, as *U. campestris aurea Roetzlii*). Probably an error for *aurea Rosseelsii* = 'ROSSEELSI'.
- 'AUREO-VARIEGATA' (Weston, Bot. Univ. 1: 315. 1770, as *U. hollandica* var. *aureo-varieg.*). Described as having leaves variegated with yellow. *U. × hollandica*.
- 'AUREO-VARIEGATA' (Schelle in Beissner et al., Handb. Laubh.-Benenn. 87. 1903, as *U. effusa* f. *aureo-variegata* Hort., without description; Henry in Elwes & Henry, Trees Gr. Brit. Irel. 7: 1853. 1913). Described as having leaves spotted with yellow. *U. laevis*.
- 'Aureo-variegata' (Weston, Bot. Univ. 1: 314. 1770, as *U. campestris aureo-var.*) = 'FOLIA AUREA'.
- 'AUREO-VARIEGATA' (Weston, Bot. Univ. 1: 315. 1770, as *U. campestris* var. *angustifolia aureo-varieg.*). Described as the gold-striped narrow-rough-leaved Elm. Probably a cultivar of *U. × viminalis* (that is *U. procera* var. *viminalis* sensu Rehder).
- 'Aureo-variegata' (Weston, Fl. Angl. 46. 1775, as *U. glabra* var. *aureo-variegata*) = 'LUTEO-VARIEGATA'.

'AURESCENS' (Dieck, Neuheiten-Offerten, Nat.-Arb. Zöschen, Germany, 1894-95, p. 12, as *U. pinnato-ramosa* f. *aurescens*). Described as having the leaves of emergent shoots yellowish. Originated in the National Arboretum, Zöschen, near Merseburg, Germany. *U. pumila*.

'AUSTRALIS' (Loudon, Arb. Frut. Brit. 3: 1398. 1838, as *U. montana* var. *australis* Hort.). Described as having "rather small leaves and a more pendulous habit of growth than the species". *U. glabra*.

'Bataviana' (Simon-Louis, Metz, France, Cat. 1869, as *U. campestris bataviana*, without description) = 'BELGICA'.

'Batavina' (Koch, Dendr. 2 (1): 414. 1872, as *U. batavina*) = 'BELGICA'.

'BEA SCHWARZ' (J. C. Went in Ned. Staatscourant, 4 Nov. 1948, no. 214 [not seen] and in Meded. Comité Best. Bestr. Iepen. 44: 6. 1949 [not seen]; Krüssmann in Parey's Blumengärtn. ed. 2. 1: 519. 1958, as a cv.). A selection raised by the elm disease committee in the Netherlands from French seed, about 1945, for its resistance to Dutch Elm Disease, issued in 1948, and said to be slightly hardier than 'Christine Buisman'. Earlier referred to as "Clone no. 62." *U. × hollandica*.

'BEAVERLODGE' (Rept. 11th Annual Meeting of the West Canadian Society for Horticulture 1955 [not seen]). Selected in 1925 as a seedling from the Experimental Station, Morden, Manitoba, for its hardiness and vigor with an upright, moderately spreading head. Introduced by the Experimental Farm, Research Branch, Canada Dept. of Agriculture, Beaverlodge, in 1954. *U. americana*.

'BEEBE'S WEEPING' (Meehan in Garden & Forest 2: 286. 1889, as "Beebe's Weeping Elm" and *U. fulva pendula*). Described as having branches which are thick and cord-like but curve over as they grow, much as those in the Weeping Willow. Propagated by grafting from a tree growing wild near Galena, Illinois, collected by Mr. E. Beebe. *U. americana*.

'BELGICA' (Weston, Fl. Angl. 46. 1775, as *U. belgica*, without description; Krüssmann in Parey's Blumengärtn. ed. 2. 1: 519. 1958, as a cv.). As an epithet under the International Code of Botanical Nomenclature *belgica* is an obligate synonym of *U. × hollandica* but as the International Code of Nomenclature for Cultivated Plants is independent of the Botanical Code the name is here maintained as a cultivar for the clone widely grown and known as such in the Netherlands. *U. × hollandica*.

'BERARDII' (Simon-Louis, Metz, France, Cat. 1869, p. 96. fig. 7. 1869, as *U. Berardii*; Krüssmann, Handb. Laubgeh. 2: 539. 1962, as a cv.). Raised in the nursery of Messrs. Simon-Louis, near Metz, in 1863. A bushy tree with slender upright branches. Judging from dried specimens of this plant it is possibly a form of *U. pumila*.

'BETULAEFOLIA' (Loddiges, Hackney, London, Cat. 1836 [not seen]; Loudon, Arb. Frut. Brit. 3: 1376. 1838, as *U. campestris* var. *betulaefolia*). Described as

- having "leaves somewhat resembling those of the common birch," and again as "a tree of pyramidal habit with ascending branches and elliptic to elliptic-oblong leaves 4-8 cm. long, narrowed toward the unequal base." Probably *U. × viminalis* (that is *U. procera* var. *viminalis* sensu Rehder) to which, according to Dr. Melville, the tree growing under this name at Kew may be attributed.
- 'Betulinoides' (Dieck, Zöschen, Germany, Haupt-Cat. Nachtrag I, 1887, p. 28) = *U. carpinifolia* 'BETULAEFOLIA'.
- 'Betuloides' (Kirchner in Petzold & Kirchner, Arb. Muscav. 553. 1864, as *U. suberosa betuloides* Hort., name in synonymy) = 'BETULAEFOLIA'.
- 'BILTII' (Groenewegen en Zoon, de Bilt, Netherlands, Cat. 1921-22, as *U. campestris Bilti* [not seen]). Selected by Bernard Groenewegen in his nursery at de Bilt, possibly from French seedlings. Said to have a compact, pyramidal crown, not unlike the Cornish Elm, with dark green, nearly round, and crowded leaves. Tips of young shoots with a purplish-bronze tinge, contrasting with the yellowish-green young leaves. *U. carpinifolia*.
- 'Bilti' (Pierre Lombarts, Royal Nurseries, Zundert, Netherlands, Cat. 1959-60, p. 83). Error for 'BILTII'.
- 'Bitchuiense' (Plant Buyer's Guide, ed. 5. 253. 1949). Mistake for *Viburnum bitchiuense*.
- 'Boulevard' (Rosehill Gardens, Kansas, Missouri, Cat. Spring 1960 [not seen]) = 'ROSEHILL'.
- 'Brea' (Keeline-Wilcox Nursery, Brea, California, Cat. Winter 1952 [not seen]) = 'DRAKE'.
- 'Broadleaf Hybrid' (E. L. Kammerer in Bull. Pop. Inf. Morton Arb. 36 (5): 25. 1961). Found in a nursery row in 1938 or 1939 at the Neosho Nurseries, Neosho, Missouri, who state that it is a bud sport of *U. pumila* and not a hybrid as the name suggests. = 'GREEN KING'.
- 'Bubyriana' (Litvinov in Sched. Herb. Fl. Ross. 8: 23, no. 2444. t. 2. 1922, as *U. densa* var. *Bubyriana*). Described from a cultivated tree in Samarkand, Turkestan. Mentioned by Lozina-Lozinskaia (in Sokolov, Trees & Shrubs in the U.S.S.R. [in Russian] 2: 505. 1951) under *U. densa*, as a cultivated form, but by Iarmolenko (in Komarov, Fl. U.S.S.R. 5: 369. 1936) as a cultivated form closer to *U. campestris umbraculifera* than *U. densa*. Furthermore Litvinov (in Sched. Herb. Fl. Ross. 6: 163, no. 1991. 1908) states that he believes the plant called "Narwan" in Persia, and which in 1922 he called var. *bubyriana* to be the same as the "Närband" of Trautvetter which is the latter's var. *umbraculifera*. = 'UMBRACULIFERA'.
- 'Buisman' (Plant Buyer's Guide, ed. 6. 285. 1958, without description) = 'CHRISTINE BUISMAN'.

- 'Burejaeticum' (Plant Buyer's Guide, ed. 5. 253. 1949). Mistake for *Viburnum burejaeticum*.
- 'Bush' (Plant Buyer's Guide, ed. 5. 253. 1949, as *U. glabra* Bush, without description) = 'NANA'.
- 'Buxifolia' (Nicholson, Kew Hand-List Trees & Shrubs 2: 135. 1896, as *U. buxifolia* Hort., in synonymy, without description) = 'MYRTIFOLIA'.
- 'Camperdown' (Plant Buyer's Guide, ed. 5. 253. 1949, as *U. glabra* Camperdown) = 'CAMPERDOWNII'.
- 'CAMPERDOWNII' (Rehder in Bailey, Cycl. Amer. Hort. (4): 1881. 1902, as *U. camperdownii* Hort.; Krüssmann in Parey's Blumengärtn. ed. 2. 1: 519. 1958, as a cv.). The Camperdown Elm. Described as "having branches and branchlets pendulous, forming a globose head, in marked contrast to the flat stiff-looking crown of var. *pendula*." Originated at Camperdown House, near Dundee, Scotland, about 1850. A nothomorph of *U. × vegeta* (that is, *U. × hollandica* var. *vegeta* sensu Rehder) with close similarity to *U. glabra*.
- 'CEBENNENSIS' (Audibert, Tonelle, France, Cat. Arb. 2, p. 53. 1831-32, as *U. campestris* var. *cebennensis*, without description; Loudon, Arb. Frut. Brit. 3: 1398. 1838). The Cevennes Elm. "Its habit is spreading like that of *U. montana vulgaris* but it appears of much less vigorous growth." *U. glabra*.
- 'CHINKOTA' (South Dakota Farm & Home Research 7: 14. 1955, but named previously by the South Dakota Farm Forestry Council). A line selected at South Dakota State Experiment Station from 'Harbin Strain' for its early ripening habit and tendency to remain dormant until after severe spring frosts are passed; distributed by the Station as certified seed. Said by some to be the same as 'Dropmore'. *U. pumila*.
- 'CHRISTINE BUISMAN' (Meded. Comité Best. Bestr. Iepen. 26: 1. 1938 [not seen] and J. C. Went in Phytopath. Zeits. 11 (2): 188. 1938 [not seen]; Boom, Ned. Dendr. 1: 158. 1959, as a cv.). A selection made by Dr. Christine Buisman at the Phytopathology Laboratory "Willie Commelin Scholten," Baarn, Netherlands, from plants grown from seed collected in Madrid, Spain, in 1928. Released to growers after her death in 1937, and referred to in earlier reports as "no. 24." Resistant to Dutch elm disease. Attributed by Dr. Melville to *U. × hollandica* and by others to *U. carpinifolia*.
- 'Cicestria' (W. A. & J. Mackie, Norwich, Cat. 1812, p. 59, as *U. campestris* var. *cicestria*, without description) = 'VEGETA'.
- 'CINEREA' (André Leroy Nurseries, Angers, France, Cat. 1856, p. 70, as *U. cinerea*, without description; Planchon in De Candolle, Prodr. 17: 160. 1873). Said to have branches which are "stunted and tortuous, the upper ascending, the lower more or less pendulous. Leaves crowded and similar to those of var. *fastigiata* from which var. *cinerea* appears to differ only in not being fastigate in habit." The tree of this cultivar at Kew is *U. × hollandica*.

'Cinerea' (Kirchner in Petzold & Kirchner, Arb. Muscav. 565. 1864, as *U. cinerea* Hort., name in synonymy) = 'NIGRA'.

'Clemmeri' (Lavallée, Arb. Segrez. 235. 1877, as *U. campestris* var. *Clemmeri*, without description) = 'KLEMMER'.

'Cochleata' (C. de Vos, Handboek 204. 1887 [not seen]) = 'CUCULLATA'.

'COLORANS' (Kirchner in Petzold & Kirchner, Arb. Muscav. 559. 1864, as *U. effusa* var. *colorans*). Described as turning a beautiful scarlet red in the autumn, not golden. *U. laevis*.

'COLUMNARIS' (Rehder in Jour. Arnold Arb. 3: 42. 1921, as a form). Described as a columnar form discovered by Mr. John Dunbar inside a garden wall at Conesus Lake, New York. *U. americana*.

'COMMELIN' (Bosbouwproefstation Baarn ex Boom, Ned. Dendr. 1: 158. 1959, as a cv.). This cultivar has a fair resistance to Dutch Elm Disease and was selected for this at the Phytopathology Laboratory "Willie Commelin Scholten" at Baarn, Netherlands. Derived from a cross between *U. × vegeta* and a selected French seedling of *U. carpinifolia*, made in 1940, at the Laboratory of Genetics, Wageningen; it differs from 'Vegeta' in the narrower habit, the darker gray branches, the duller and brown branchlets, the smaller leaves, the smaller number of veins (9–12) and the pilose undersides of the leaves. *U. × vegeta* (that is, *U. × hollandica* var. *vegeta* sensu Rehder).

'CONCAVAEFOLIA' (Loudon, Arb. Frut. Brit. 3: 1378. 1838, as *U. campestris* var. *concavaefolia* Hort.). Described as resembling var. *cucullata*. *U. carpinifolia*.

'COOLSHADE' (Sarcoxie Nurseries, Sarcoxie, Missouri, Cat. 1951, p. 6). Originated in 1946 from the parent tree growing in the Sarcoxie Nurseries, and said to be of rapid, stocky growth with a compact top resistant to breakage under ice and snow and foliage a much darker green. Said to be a hybrid of *U. pumila* × *rubra*.

'Cornubiensis' ([Weston] Boom, Ned. Dendr. 1: 158. 1959, as a cv.). The Cornish Elm. More correctly placed in the botanical rank of variety: *U. angustifolia* (Weston) Weston var. *cornubiensis* (Weston) Melville (*U. carpinifolia* Gled. var. *cornubiensis* (Weston) Rehder).

'CORNUBIENSIS PARVIFOLIA' (Boulger in Gard. Chron. II. 12: 298. 1879, as *U. campestris cornubiensis parvifolia*, without description). Probably *U. angustifolia*.

'CORNUTA' (David in Revue Hort. II. 4: 102. 1845, as *U. campestris cornuta*; Boom, Ned. Dendr. 1: 157. 1959, as a cv.). The large leaves have two long projections or lobes on the shoulders or apex. *U. glabra*.

'CORYLIFOLIA' (Host, Fl. Austr. 1: 329. 1827, as *U. corylifolia*). Described as having broad-ovate, scabrid leaves, doubly toothed with broad, obtuse teeth.

- Later as having "leaves 8×6 cm., rather crowded, usually slightly rough and similar to *scabra* [glabra] but according to the texture, position and fruits, belonging to *glabra* [carpinifolia]." *U. glabra*.
- 'Corylifolia' (Zapelowicz, Conspec. Fl. Galic. 2: 98. 1908, as *U. montana* var. *corylifolia*, not *U. corylifolia* Host) = 'CORNUTA'.
- 'CORYLIFOLIA PURPUREA' (Pynaert in Tijdschr. Boomteelt. [Bull. Arb. Flor. Cult. Potag.] 1879: 57. 1879, as *U. campestris corylifolia purpurea*). Described as having large purplish leaves resembling those of a Hazel in shape. Raised from seed of 'Purpurea'. *U. glabra*.
- 'CRETENSIS' (Nicholson, Kew Hand-List Trees & Shrubs 2: 135. 1896, as *U. campestris* var. *cretensis* Hort., without description).
- 'CRISPA' (Willdenow, Enum. Pl. Hort. Berol. 295. 1809, as *U. crispa*; Krüssmann, Handb. Laubgeh. 2: 536. 1962, as a cv.). The Fernleaf Elm. Leaves narrow, incisely serrate with twisted and incurved teeth; of slow growth. *U. glabra*.
- 'Crispa Aria' (Maxwell ex Jour. Roy. Hort. Soc. 18: 91. 1895, as *U. montana* var. *crispa aria*, without description). Error for 'CRISPA AUREA'?
- 'CRISPA AUREA' (Schelle in Beissner et al., Handb. Laubh.-Benenn. 86. 1903, as *U. montana crispa aurea* Hort., without description; Schneider, Illus. Handb. Laubh. 1: 217. 1904). Described as "like f. *crispa* but with more or less golden leaves." *U. glabra*.
- 'Crispa Incisa' (Koch, Dendr. 2 (1): 416. 1872, as *U. crispa incisa*, name in synonymy) = 'EXONIENSIS'.
- 'CUCULLATA' (Loddiges, Hackney, England, Cat. 1823, p. 35, as *U. campestris cucullata*, without description; Loudon, Arb. Frut. Brit. 3: 1378. 1838, as *U. campestris* var. *cucullata*). "Has the leaves curiously curved, something like a hood." *U. carpinifolia*.
- 'Cucullata Folia Variegata' (C. de Vos, Woordenboek 135. 1867, as *U. americana cucullata fol. var.*) = 'CUCULLATA VARIEGATA'.
- 'CUCULLATA VARIEGATA' (Schelle in Beissner et al., Handb. Laubh.-Benenn. 82. 1903, as *U. campestris concavifolia cucullata variegata* Hort., without description). *U. carpinifolia*.
- 'Dampier' (Plant Buyer's Guide, ed. 6. 1285. 1958, as *U. carpinifolia* Dampier, without description) = 'DAMPIERI'.
- 'DAMPIERI' (Wesmael in Bull. Féd. Soc. Hort. Belg. 1862: 389. 1863, as *U. campestris* var. *nuda* subvar. *fastigiata Dampieri* Hort. Vilv.; Boom, Ned. Dendr. 1: 158. 1959, as a cv.). Described as a narrow pyramidal tree, leaves crowded on short branchlets, broadly ovate, deeply and doubly toothed with crenately serrate teeth. Specimens in the Kew herbarium from cultivation have been determined by Dr. Melville as *U. × hollandica*.

- 'Dampieri Aurea' (Wrede ex Jäger & Beissner, Ziergeh. Gärt. & Park. ed. 2. 403. 1884, as *U. montana* var. *Dampieri aurea*) = 'WREDEI'.
- 'DAUVESSEI' (Nicholson in Kew Hand-List Trees & Shrubs 2: 139. 1896, as *U. montana* var. *Dauvessei* Hort., without description; Henry in Elwes & Henry, Trees Gr. Brit. Irel. 7: 1874. 1913; Krüssmann in Parey's Blumengärtn. ed. 2. 1: 519. 1958, as a cv.). Described as having branches ascending, forming a broad pyramidal tree. Leaves smaller and thinner in texture than *U. glabra*, rarely exceeding 4 in. long and 2¼ in. wide, with petioles up to ¼ in. long. *U.* × *hollandica*.
- 'Dauvessi' (Lavallée, Arb. Segrez. 235. 1877, as *U. campestris* var. *Dauvessi* Hort., without description) = 'DAUVESSEI'.
- 'Decumbens' (Masters, Hort. Duroverni 67. 1831, as var. *decumbens*, without description, name in synonymy) = 'HORIZONTALIS'.
- 'De Dumont' (Plant Buyer's Guide, ed. 6. 286. 1958, without description) = 'DUMONT'.
- 'DENSE' (Litvinov in Sched. Herb. Fl. Ross. 6: 163, no. 1991. t.1, 2. 1908, as *U. densa*). Maintained at specific rank by Lozina-Lozinskaia (in Sokolov, Trees & Shrubs in the U.S.S.R. [in Russian] 2: 504. 1951) and by Mulkidjanian (in Takhtajan, Fl. Armenia [in Russian] 4: 341. 1962) but stated to be unknown in the wild and maintained in cultivation solely by budding on *U. carpinifolia*. In Armenia there are said to be two forms; the typical one with a few main branches which are much branched in the upper part, with dense foliage of thicker and darker leaves and almost sterile. The other much branched from the place of the graft but on the whole with a less dense more uniformly developed crown, the leaves less leathery and lighter and with fruit produced almost every year. Probably the former is Litvinov's *U. densa* var. *bubyriana*, despite the use of the word "typical" above. *Ulmus densa* was treated by Rehder (Bibl. Cult. Trees & Shrubs, 142. 1949) as a synonym of *U. carpinifolia* var. *umbraculifera*, which var. *bubyriana* almost certainly is.
- 'DICKSONII' (Dickson ex Jour. Roy. Hort. Soc. 32: cxix. 1907, without description; Dickson's Nurseries, Chester, England, Cat. 667, p. 31. 1909-10, as *U. campestris cornubiensis Dicksonii*). Described as being free and upright in growth, the foliage a clear glowing gold, very constant, and retained till late in the autumn. Originated in Dickson's Nurseries about 1900. *U.* × *sarniensis* (that is *U. carpinifolia* var. *sarniensis* sensu Rehder).
- 'DIJKWEL' (Van 't Westeinde, Holland, Cat. 27, p. 28. 1957-58 [not seen]). Said to resemble 'Schuurhoek' closely, have slightly larger and lighter leaves, and be more difficult to propagate from cuttings. Original tree free from frost-cracks. *U. carpinifolia*.
- 'DRAKE' (Monrovia Nursery, Azusa, California, Cat. 1952-53 [1 July 1952, not seen]). Described as having "rich evergreen foliage on sweeping branches which grow more upright than the regular evergreen elm." *U. parvifolia*.

- 'DOVAEI' (André Leroy Nurseries, Angers, France, Cat. 1868, p. 82, as *U. Dovaei*). Described as a vigorous tree, well shaped, proper for avenues. *U. glabra*.
- 'DOWEI' (Baudriller, Angers, France, Cat. 43, p. 117. 1880, as *U. Doweii*, without description) = 'DOVAEI'.
- 'DROPMORE' (1953 Report of the Great Plains Section of the Amer. Soc. for Horticultural Science [not seen]). A name proposed to replace 'Harbin Strain', 'Harbin', 'Manchu', and 'Chinkota', on the assumption that these are all the same line, and to remove the confusion of several names for the same cultivar. *U. pumila*.
- 'DUMONT' (Anon. in Rev. Hort. Belg. 18: 12. 1892, as *l'Orme Dumont*). Described as very vigorous, having a straight trunk and a narrow, regularly formed, pyramidal crown. The leaves being somewhat smaller than in 'Belgica'. Discovered by a gardener on the estate of M. Dumont at Tournay in Belgium about 1865. *U. × hollandica*.
- 'Dumontii' (Mottet in Nicholson & Mottet, Dict. Prat. Hort. 5: 383. 1898, as *U. campestris* var. *Dumontii*; Krüssmann, Handb. Laubgeh. 2: 537. 1962, as a cv.) = 'DUMONT'.
- 'Elegans Folia Argenteo-variegata' (Goeschke, Bunte Gehölze 46. 1900, as *U. campestris elegans foliis argenteo variegatis* Hort.). Described as having beautiful gray-green foliage with a broad silver margin, and the tip of the shoot pink. = 'TRICOLOR'.
- 'Elegantissima' (Kirchner in Petzold & Kirchner, Arb. Muscav. 556. 1864, as *U. suberosa elegantissima* Hort., in synonymy, not *U. × elegantissima* Horwood, 1933) = *U. × viminalis* 'VARIEGATA'.
- 'Elegantissima Variegata' (Miller, Gard. Dict. ed. 6. *Ulmus* no. 6. 1752, as *U. minor, folio angusto scabro, elegantissime variegato*). Described as having beautiful striped leaves. = *U. procera* 'ARGENTEO-VARIEGATA'?
- 'Eleganto-variegata' (Miller, Gard. Dict. ed. 6. *Ulmus* no. 7. 1752, as *U. folio glabro, eleganter variegato*) = *U. carpinifolia* 'VARIEGATA'.
- 'ELEGANTO-VARIEGATA' (Miller, Gard. Dict. ed. 6. *Ulmus* no. 9. 1752, as *U. major Hollandica, angustis & magis acuminatis samarris, folio latissimo scabro, eleganter variegato*). Described as the Dutch Elm with striped leaves. *U. × hollandica*.
- 'ERECTA' (Loudon, Arb. Frut. Brit. 3: 1396. 1838, as *U. (campestris) suberosa* var. *erecta*). "Has a tall narrow head, resembling the Cornish Elm; but differing from that tree in having much broader leaves, and a corky bark." *U. carpinifolia*.
- 'Erubescens' (Henry in Elwes & Henry, Trees Gr. Brit. Irel. 7: 1853. 1913, as *U. pedunculata* var. *erubescens*) = 'RUBESCENS'.

- 'ESCAILLARD' (André Leroy Nurseries, Angers, France, Cat. 1849, p. 28, as *Ulmus "elm" escaillard*, without description; Lavallée, Arb. Segrez. 235. 1877, as *U. campestris* var. *Escaillardi*, without description). *U. glabra*.
- 'ETRUSCA' (Nicholson, Kew Hand-List Trees & Shrubs 2: 139. 1896, as *U. montana* var. *etrusca* Hort., without description). The tree with this name at Kew has been identified by Dr. Melville as of hybrid origin, *U. glabra* × *plotii* (*U. × elegantissima*).
- 'Evergreen' (Plant Buyer's Guide, ed. 5. 253. 1949, as *U. parvifolia* Evergreen, without description) = 'SEMPERVIRENS'.
- 'EXHIBITION' (Patmore Nurseries, Brandon, Manitoba, Cat. 1952 [not seen]). A selection made by Patmore Nurseries from seed gathered near Brandon in Manitoba and propagated clonally by grafting. Upright in habit, it develops a narrow vase-shaped head with branches densely covered with small twigs. *U. americana*.
- 'EXONIENSIS' (Loddiges, Hackney, London, Cat. 1823, p. 35, as *U. exoniensis*, without description; Krüssmann in Parey's Blumengärtn. ed. 2. 1: 519. 1958, as a cv.). The Ford or Exeter Elm. Said to have strictly upright branches forming a narrow columnar head, leaves small, broadly obovate, coarsely and deeply serrate, wrinkled above and often twisted. Raised at Exeter, England, by Mr. Ford. *U. glabra*.
- 'Fastigiata' (Audibert, Tonelle, France, Cat. 2, p. 53. 1831-32, as *U. suberosa fastigiata*) = *U. angustifolia* var. *cornubiensis* (*U. carpinifolia* var. *cornubiensis*).
- 'Fastigiata' (Loudon, Arb. Frut. Brit. 3: 1399. 1838, as *U. montana* var. *fastigiata* Hort.). Described as having "peculiarly twisted leaves and a very fastigiate habit of growth" = 'EXONIENSIS'.
- 'Fastigiata' (Charles Fiore Nurseries, Prairie View, Illinois, Wholesale Cat. 1959-60, p. 33). Latin name proposed after 1 Jan. 1959 and therefore illegitimate. = 'FIOREI'.
- 'Fastigiata Aurea' (Nicholson, Kew Hand-List Trees & Shrubs 2: 141. 1896, as *U. montana* var. *fastigiata aurea* Hort., without description) = 'WREDEI'.
- 'FASTIGIATA MACROPHYLLA' (Dieck, Zöschen, Germany, Haupt-Cat. 1885, p. 82, as *U. scabra fastigiata macrophylla* Hort., without description; Hartwig, Ill. Gehölzb. ed. 2. 393. 1892). Described as a beautiful pyramidal form with large leaves. *U. glabra*.
- 'Fastigiata Plumosa' (Schelle in Beissner et al., Handb. Laubh.-Benenn. 85. 1903, as *U. montana* f. *fastigiata plumosa* Hort., without description). = 'EXONIENSIS'.
- 'FASTIGIATA STRICTA' (Bean, Kew Hand-List Trees & Shrubs, ed. 3. 273. 1925, as *U. montana* var. *fastigiata stricta* Hort., without description). *U. glabra*.

- 'FASTIGIATA VARIEGATA' (Baudriller, Angers, France, Cat. 43, p. 117. 1880, as *U. montana fastigiata variegata*, without description). Referred to as the variegated, pyramidal, Exeter elm. *U. glabra*.
- 'FIOREI' (Charles Fiore Nurseries, Prairie View, Illinois, Wholesale Cat. 1948). Described as a budded elm of narrow form with heavy foliage, dense growth, and smooth bark. *U. americana*.
- 'FIRMA' (Schneider, Ill. Handb. Laubh. 1: 217. 1904, as *U. scabra* f. *firma*). Said to have leaves like the species but with a firmer texture. *U. glabra*.
- 'FJERRESTAD' (Meded. Comité Best. Bestr. Iepen. 13: 9. 1933, as *U. hollandica* "Fjerrestad" [not seen], without description). The clone was received from Sweden.
- 'FLAVA' (Dieck, Zöschén, Germany, Haupt-Cat. Nachtrag I, 1887, p. 28, as *U. scabra* f. *flava*, without description). *U. glabra*.
- 'FOLIA ALBO-PUNCTATA' (C. de Vos, Woordenboek 135. 1867, as *U. campestris* fol. *albo punctatis*). With leaves dotted with white, not flecked. Probably *U. carpinifolia*.
- 'Folia Argentea' (Baudriller, Angers, France, Cat. 43, p. 116. 1880, as *U. campestris foliis argenteis*). Described as having leaves which are very beautifully and constantly variegated, and resist the bleaching of sunlight. Possibly = *U. carpinifolia* 'VARIEGATA'.
- 'Folia Argenteo-marginata' (Kirchner in Petzold & Kirchner, Arb. Muscav. 557. 1864, as *U. campestris* var. *foliis argenteo-marginatis*). This variety was placed by de Vos (Handboek 203. 1887) in synonymy with 'Tricolor' but the leaves are generally described as bordered with white alone. = 'ARGENTEO-MARGINATA'.
- 'Folia Argenteo-marmorata' (Dippel, Handb. Laubh. 2: 25. 1892, as *U. campestris* f. *fol. argenteo-marmoratis*). Described as having leaves streaked with white. = 'MARMORATA'?
- 'Folia Argenteo-variegata' (Kirchner in Petzold & Kirchner, Arb. Muscav. 554. 1864, as *U. campestris* var. *foliis argenteo-variegatis* Hort.). Described as having the leaves streaked with white. = *U. procera* 'ARGENTEO-VARIEGATA'.
- 'Folia Aurea' (Loudon, Arb. Frut. Brit. 3: 1378. 1838, as *U. campestris* var. *foliis aureis* Hort.). Described as having the leaves variegated with yellow. *U. procera*.
- 'Folia Aurea' (Huberty in Bull. Soc. Centr. For. Belg. 11: 427. 1904, as *U. campestris foliis aureis*) = 'LOUIS VAN HOUTTE'.
- 'FOLIA AUREA VARIEGATA' (Jäger, Ziergh. Gärt. & Park. 548. 1865, as *U. americana* var. *fol. aur. varieg.*). Described as having leaves variegated with yellow. *U. americana*.

- 'Folia Aureo-variegata' (Baudriller, Angers, France, Cat. 43, p. 116. 1880, as *U. campestris latifolia foliis aureo-variegatis*) = 'LATIFOLIA AUREO-VARIEGATA'.
- 'Folia Flavescens' (Miller, Gard. Dict. ed. 6. *Ulmus* no. 8. 1752, as *U. minor, foliis flavescens*). Described as the yellow-leaved Elm. = 'LOUIS VAN HOUTTE'?
- 'Folia Maculata' (Loddiges, Hackney, London, Cat. 1823, p. 35, as *U. campestris fol. maculatis*, without description) = *U. procera* 'ARGENTEO-VARIEGATA'?
- 'Folia Marginata' (Wesmael in Bull. Féd. Soc. Hort. Belg. 1862: 389. 1863, as *U. campestris* var. *nuda* subvar. *foliis marginatis*) = 'ARGENTEO-MARGINATA'.
- 'Folia Picturata' (Dippel, Handb. Laubh. 2: 25. 1892, as *U. campestris* f. *fol. picturatis*). Described as having the leaves spotted with white. = 'PICTURATA'.
- 'Folia Punctata' (Dieck, Zöschén, Germany, Haupt-Cat. 1885, p. 82, as *U. scabra viminalis fol. punctatis*, name in synonymy) = 'PULVERULENTA'.
- 'Folia Purpurea' (Lavallée, Arb. Segrez. 235. 1877, as *U. campestris* var. *foliis purpureis*, without description) = *U. carpinifolia* (?) 'PURPUREA'.
- 'FOLIA RHOMBOIDEA' (Morren in Jour. Agric. Prat. Belg. 4: 509, 511. 1851, as *U. campestris latifolia, foliis rhomboideis*). Said to be growing in the Pitteurs estate at St. Trond, Belgium and to be like *foliis rotundatis* ('Pitteurs') but distinguished by the rhomboid shape of the leaf. *U. × hollandica*.
- 'Folia Rotundata' (Morren in Jour. Agric. Prat. Belg. 4: 509, 511. 1851, as *U. campestris latifolia, foliis rotundatis*) = 'PITTEURS'.
- 'FOLIA RUBRA' (Louis de Smet, Ghent, Belgium, Cat. 10, p. 59. 1877, as *U. campestris foliis rubris*). Later described as having small leaves with a reddish green tinge. Probably *U. carpinifolia*.
- 'Folia Variegata' (Loudon, Arb. Frut. Brit. 4: 2587. 1838, as *U. americana* var. *foliis variegatis* Hort., without description) = 'FOLIA AUREA VARIEGATA'.
- 'FOLIA VARIEGATA' (Hartwig, Ill. Gehölzb. ed. 2. 392. 1892, as *U. pedunculata* var. *foliis variegatis* Hort.). Described as having leaves beautifully marked with marbled and streaked variegations. *U. laevis*.
- 'Folia Variegata' (Loddiges, Hackney, London, Cat. 1820, p. 39, as *U. campestris fol. var.*, without description; Loudon, Arb. Frut. Brit. 3: 1376. 1838). Described as having leaves striped with white. = 'ARGENTEO-VARIEGATA'.
- 'Folia Variegata' (Loddiges, Hackney, London, Cat. 1823, p. 35, as *U. campestris fol. variegatis*, without description; Loudon, Arb. Frut. Brit. 3: 1395. 1838, as *U. (campestris) suberosa* var. *foliis variegatis*). Described as being exactly like *U. suberosa* except in its variegation. = *U. carpinifolia* 'VARIEGATA'.
- 'Folia Variegata' (Loddiges, Hackney, London, Cat. 1823, p. 35, as *U. major fol. variegatis*, without description) = 'ELEGANTO-VARIEGATA'.

- 'Folia Variegata' (Dieck, Zöschen, Germany, Haupt-Cat. 1885, p. 82, as *U. scabra viminalis fol. variegatis*, name in synonymy) = 'VIMINALIS MARGINATA'.
- 'Folia Variegata' (C. de Vos, Handboek, 1887, as *U. plumosa foliis variegatis* [not seen]) = 'FASTIGIATA VARIEGATA'.
- 'FOLIA VARIEGATA PENDULA' (C. de Vos, Woordenboek 137. 1867, as *U. suberosa fol. var. pendula*). Described as a weak growing tree, of unsatisfactory duration but otherwise beautiful. Possibly *U. × hollandica*.
- 'Fordii' (Loudon, Arb. Frut. Brit. 3: 1399. 1839, as *U. Fordii* Hort., name in synonymy) = 'EXONIENSIS'.
- 'FULVA' (Meded. Comité Best. Bestr. Iepen. 10: 9. 1932, as *U. hollandica* var. *fulva* Hort., without description [not seen]). Received from Hesse's Nurseries, Weener, Germany. *U. × hollandica*.
- fungosa* (Aiton, Hort. Kew. 1: 319. 1789, as *U. campestris* var. *fungosa*). See under *suberosa*.
- 'GAUJARDII' (Silva Tarouca, Unsere Freil.-Laubgeh. 366. 1913, as *U. Gaujardii*, without description). *U. × hollandica*.
- 'Gigantea' (Kirchner in Petzold & Kirchner, Arb. Muscav. 564. 1864, as *U. montana* var. *gigantea* Hort.) = *U. × hollandica* 'MAJOR'.
- 'Glabra' (Walpers, Ann. Bot. Syst. 3: 424. 1852, as a var.) = *U. americana* 'PENDULA'.
- 'GLOBOSA' (Späth, Berlin, Germany, Cat. 89, p. 57. 1892-1893, as *U. campestris globosa* Behnsch). Described as having an uninterrupted, very dense, strongly branched, globose crown with firm, coriaceous, shining leaves; said to be quite different from 'Umbraculifera'. Probably *U. carpiniifolia*.
- 'Gracilis' (Kirchner in Petzold & Kirchner, Arb. Muscav. 551. 1864, as *U. gracilis* Hort., name in synonymy) = 'VIMINALIS'.
- 'Gracilis' (Krüssmann, Handb. Laubgeh. 2: 534. 1962, as a cv.) = 'UMBRACULIFERA GRACILIS'.
- 'Gracilis Aurea' (Schelle, in Beissner et al., Handb. Laubh.-Benenn. 86. 1903, as *U. montana viminalis gracilis aurea* Hort., without description) = 'PULVERULENTA'.
- 'Gracilis Monstrosa' (Lavallée, Arb. Segrez. 235. 1877, as *U. campestris* var. *gracilis monstrosa*, without description) = *U. × sarniensis* 'MICROPHYLLA PENDULA'.
- 'Grandidentata' (Dumortier, Fl. Belg. 25. 1827, as *U. corylacea* var. *grandidentata*) = 'CORNUTA'.
- 'GREEN KING' (Henry Field Seed & Nursery Co., Shenandoah, Iowa, Spring Cat.

1960, as a registered trade mark, ®). Stated to be of hybrid origin, and first distributed as Field's new hybrid elm, but see under 'Broadleaf Hybrid'. Described as of particularly rapid growth.

'HAMBURG' (Interstate Nurseries, Hamburg, Iowa, Cat. Spring 1948, p. 34, as Hamburg Elm). Said to be a hybrid of *U. americana* and *U. pumila*. Described as a hardy, very rapid grower and stronger in branching than *U. pumila*. Originated in the Plumfield Nurseries, Fremont, Nebraska, in a bed of seedlings raised from seed of *U. pumila* from Tekamah, Nebraska, and selected by Mr. Lloyd Moffet, about 1932. Has also been sold as the "Hybrid Chinese Elm."

'Hamburg Hybrid' (Interstate Nurseries, Hamburg, Iowa, Cat. Spring, 1949, p. 34, as Hamburg Hybrid Elm) = 'HAMBURG'.

'Harbin' (Skinner's Nursery Ltd., Manitoba, Cat. 1954, p. 20) = 'DROPMORE'.

'Harbin Strain' (Skinner's Nursery Ltd., Manitoba, Cat. 1951, p. 23). A hardy line raised by Dr. F. L. Skinner from seed collected by Mr. Ptitsin from near Harbin, Manchuria, quite hardy in Manitoba and described as fast growing, with small neat foliage. = 'DROPMORE'.

'HAARLEMENSIS' (Springer in Mitt. Deutsch. Dendr. Ges. **21**: 366. 1912, as *U. campestris haarlemensis*). Described as having a not very rapid growth, forming an unbroken, broad pyramidal crown; the leaves glossy dark green and remaining on the tree for two or three weeks longer in the autumn. It was selected from amongst seedlings of *U. × hollandica*. *U. × hollandica*.

'HERTFORDENSIS ANGUSTIFOLIA' (Boulger in Gard. Chron. II. **12**: 298. 1879, as *U. campestris hertfordensis angustifolia*?, without description; Loudon, Arb. Frut. Brit. **3**: 1396. 1838, as *U. (campestris) suberosa* var., "the narrow-leaved Hertfordshire Elm"). Probably *U. carpinifolia*.

'HERTFORDENSIS LATIFOLIA' (Boulger in Gard. Chron. II. **12**: 298. 1879, as *U. campestris hertfordensis latifolia*?, Loudon, Arb. Frut. Brit. **3**: 1396. 1838, as *U. (campestris) suberosa* var., "the broad-leaved Hertfordshire Elm"). Probably *U. carpinifolia*.

'HILLIERI' (Hillier & Sons, Winchester, England, Cat. 38T, p. 52. 1928, as *U. hillieri* Hort.). Described as a very graceful, slow growing, small, weeping tree with small leaves and slender branches which turn crimson in the autumn. *U. × hollandica*.

'Hoersholm' (Krüssmann, Handb. Laubgeh. **2**: 534. 1962, as a cv.) = 'HOERSHOLMIENSIS'.

'Hoersholmi' (Plant Buyer's Guide, ed. 6. 285. 1958, without description) = 'HOERSHOLMIENSIS'.

'HOERSHOLMIENSIS' (Späth, Berlin, Germany, Cat. 242, p. 69. 1928-29). A tree with upright habit and quick growth through many years, leaves clear green,

lanceolate or narrowly obovate, acuminate, base cuneate. Said to have originated in the Hørsholm Planteskole between Copenhagen and Helsingør, Denmark, probably about 1885, from seed of unknown origin. *U. carpinifolia*.

'Hoersholmensis' (Meded. Comité Best. Bestr. Iepen. 13: 10. 1933 [not seen]) = 'HOERSHOLMIENSIS'.

'HOLGERI' (Holger Jensen ex Späth-Buch 1720-1920, 230. 1921). Described as of very strong growth, straight and sturdy with beautiful dark green leaves. Originated in Sweden. *U. glabra*.

'HOLMSTRUPI' (Plant Buyer's Guide, ed. 6. 286. 1958, without description). Selected from amongst seedlings of 'Hoersholmensis' in Asger M. Jensen's Nursery, Holmstrup, Denmark about 1930, because of its strong quick-growing, upright stem and branches, bearing small leaves and making it suitable for planting in avenues. *U. carpinifolia*.

'HORIZONTALIS' (Loudon, Arb. Frut. Brit. 3: 1398. 1838, as *U. horizontalis* Hort., name in synonymy). Branches horizontally spreading and, when grafted, forming a low flat top with pendulous branches. Originated early in the 19th century as a seedling in a nursery at Perth, Scotland. A tree of this cultivar was selfed by Melville at Kew (personal communication); it segregated for the pendulous habit but remained true to species. *U. glabra*.

'Horsholmii' (Melville in Jour. Linn. Soc. Lond. Bot. 53: 88, 90. 1946, as var. *horsholmii* Hort.) = 'HOERSHOLMIENSIS'.

'Huntingdon' (Plant Buyer's Guide, ed. 5. 253. 1949, as *U. hollandica* Huntingdon, without description) = 'VEGETA'.

'Huntingdon Elm' (Richens in Forestry 34: 63. 1961). Formally proposed by Richens as a cultivar name but known by this as a common name to many previous authors = 'VEGETA'.

'Huntingdonensis' (Dieck, Zöschen, Germany, Haupt-Cat. Nachtrag I, 1887, p. 28) = 'VEGETA'.

'Huntingdonii' (Rehder in Bailey, Stand. Cycl. Hort. (6): 3411. 1917, as *U. Huntingdonii* Hort., in synonymy, without description) = 'VEGETA'.

'HUNNYBUNII' (Moss, Cambr. Brit. Fl. 2: 90. 1914, as *U. nitens* var. *hunnybuni* Moss). Described as a taller tree than var. *sowerbyi*, with the lower branches spreading at right angles, the upper less tortuous; leaves even more asymmetrical at the base, more acuminate; and said to be often planted. *U. carpinifolia*.

'IMPROVED COOLSHADE' (Sarcoxie Nurseries, Sarcoxie, Missouri, U. S. Plant Pat. No. 1747, July 1958). Originated at the Sarcoxie Nurseries. Said to be of rapid growth giving a quick shade without an unsightly whippy top, with a non-crotching central trunk and branches resistant to breaking. Said to be a hybrid of *U. pumila* × *rubra*.

- 'INCISA' (Loudon, Arb. Frut. Brit. **3**: 1406. 1838, as *U. americana* var. *incisa* H.S.). Described as having "leaves somewhat more deeply serrated and rather smaller". Possibly now extinct. *U. americana*.
- 'INCISA' (Wesmael in Bull. Féd. Soc. Hort. Belg. **1862**: 389. 1863, as *U. campestris* var. *nuda* subvar. *incisa* Hort. Vilv.). Described as having the leaves irregularly sinuate-incised with long pointed teeth. Possibly *U. × viminalis* (that is *U. procera* var. *viminalis* sensu Rehder).
- 'INSULARIS' (Nilsson in Lustgården **30**: 127. 1949, as f. *insularis*). Described as having the crown rounded elongate-ovoid, branches dense, suberect. *U. glabra*.
- 'Intermedia' (Kirchner in Petzold & Kirchner, Arb. Muscav. 567. 1864, as *U. intermedia* Hort., name in synonymy) = 'CORNUTA'.
- 'Jersey' (Plant Buyer's Guide, ed. 6. 286. 1958, as *U. procera* Jersey, without description) = 'SARNIENSIS'.
- 'KANSAS HYBRID' (Kansas Nursery Co., Salina, Kansas, Retail Cat. Spring 1961, p. 52). A selected seedling of *U. pumila* showing hybrid characteristics, raised by the Kansas Nursery Co. in the late 1920's and maintained by grafting. Described as having an upright branching habit and dark green, shining leaves as large as *U. americana*, but of fast growth and cold and drought resistant.
- 'KIMLEY' (Sheridan Nurseries, Sheridan, Ontario, Cat. 1957, p. 47). From a large tree found near Oshawa, Ontario, of fine pendulous habit. *U. americana*.
- 'Klehm' (Plant Buyer's Guide, ed. 5. 253. 1949, as *U. americana* Klehm) = 'KLEHMII'.
- 'KLEHMII' (Naperville Nurseries, Naperville, Illinois, Cat. 270, p. 6. 1929). Described as being of a shapely form. The original grafts taken from a tree in Arlington Heights, Illinois, by Mr. Charles Klehm; selected for its fine vase-shaped appearance. *U. americana*.
- 'Klemeri' (Späth, Berlin, Germany, Cat. 104, p. 134. 1899-1900, as *U. Klemeri*) = 'KLEMMER'.
- 'KLEMMER' (Gillekens, Elém. Arb. Forest. 41. 1891, as l'orme champêtre *klemmer*; Krüssmann, Handb. Laubgeh. **2**: 537. 1962, as a cv.). Said to be a rapid growing, tall tree with ascending branches forming at first a narrow pyramidal head which widens later, with plenty of root-suckers and some epicormic shoots. Susceptible to frost cracks. The timber is reddish and strong but liable to warp. Possibly attributable to *U. carpinifolia*, but probably *U. × hollandica*.
- 'KLEMMER BLANC' (Feneau in Bull. Soc. Centr. For. Belg. **9**: 162. 1902). Said to be intermediate between 'Klemmer' and 'Belgica'. The leaves are smaller than 'Klemmer' and the trees have no root-suckers or frost cracks. The timber is white and softer than 'Klemmer'. *U. × hollandica*.
- 'Klemmer Rouge' (Feneau in Bull. Soc. Centr. For. Belg. **9**: 162. 1902). = 'KLEMMER'.

- 'KOOPMANNII' (Lauche ex Späth, Berlin, Germany, Cat. 62, p. 6. 101. 1885, as *U. Koopmanni*; Krüssmann, Handb. Laubgeh. 2: 534. 1962, as a cv.). Described as a form resembling *U. carpinifolia* var. *umbraculifera* with small ovate leaves but with an ovoid head if grafted high, shrubby and stoloniferous if propagated by cuttings. *U. carpinifolia*.
- 'LACINIATA' (Wesmael in Bull. Féd. Soc. Hort. Belg. 1862: 390. 1863, as *U. campestris* var. *nuda* subvar. *microphylla laciniata* Hort. Vilv.). Described as having lacinate leaves 3 to 5 cm. long. *U. carpinifolia*.
- 'LAKE CITY' (Wyman in Trees Magazine 3 (4): 13. 1940; 4 (1): 17. 1941). Said to be upright in habit, wide at the top and narrow at the base. *U. americana*.
- 'LANUGINOSA' (Lavallée, Arb. Segrez. 236. 1877, as *U. suberosa* var. *lanuginosa*, without description). *U. carpinifolia*.
- 'LATIFOLIA' (Audibert, Tonelle, France, Cat. 1817, p. 23, as *U. campestris* var. *latifolia*). Described as having broader leaves than the species which expand very early in the spring. Possibly the same as 'Belgica' but also called 'Malines' by Gillekens (Élém. Arb. Forest. 38. 1891).
- 'LATIFOLIA AUREA' (Schelle in Beissner et al., Handb. Laubh.-Benenn. 84. 1903, as *U. glabra* var. *latifolia aurea* Hort. Croux, without description). *U. glabra*.
- 'LATIFOLIA AUREO-Variegata' (Neubert in Deutsch. Mag. Gart. Blumenk. 1871: 343. 1871, as *U. campestris latifolia aureo-variegata*). Described as a beautiful new variety with colored ornamental leaves. *U. glabra*.
- 'LATIFOLIA NIGRICANS' (Pynaert in Tijdschr. Boomteelt. [Bull. Arb. Flor. Cult. Potag.] 1879: 58. 1879, as *U. campestris latifolia nigricans*). Described as very vigorous, the leaves being large and of a dark tint. Raised from seed of 'Purpurea'. *U. glabra*.
- 'Libero-rubra' (Planchon in De Candolle, Prodr. 17: 160. 1873, as *U. libere-rubro*, without description) = 'RUBRA'
- 'LITTLEFORD' (Sherman Nursery, Charles City, Iowa, Wholesale Cat. Spring 1957, p. 5). Described as upright branching, rather narrow vase-shaped, foliage larger and somewhat heavier than usual. Grafts taken from original tree in Hinsdale, Illinois, about 1915; first marketed 1927. *U. americana*.
- 'Littlefordii' (Bailey & Bailey, Hortus Second, 746, 747. 1941, as a var.) = 'LITTLEFORD'.
- 'Lobata' (Waisbecker in Oesterr. Bot. Zeitschr. 49: 67. 1899, as *U. montana* f. *lobata*) = 'CORNUTA'.
- 'Lombartii' (Floralia 41 (39): 615. 1920, as *U. suberosa pendula Lombartii* [not seen]) = 'LOMBARTSII'.

- 'LOMBARTSII' (Lombarts, Zundert, Netherlands, Cat. 1921-22, p. 25 as *U. suberosa pendula Lombartsi* [not seen]). A graceful tree with pendulous branches covered with corky wings. As the tree ages the wings become less prominent. Originated in the Lombarts Nurseries, Zundert, Netherlands, about 1910. Possibly *U. carpinifolia* or *U. × hollandica*.
- 'LOUIS VAN HOUTTE' (Deegen in Ill. Monatsch. Gartenb. 5: 103. 1886; Boom, Ned. Dendr. 1: 158. 1959, as a cv.). Said to have leaves entirely yellow, retaining this color throughout the summer, and to have been cultivated in Belgium about 1863. From specimens, this appears to be *U. procera*.
- 'Ludwig van Houtte' (Späth-Buch 1720-1920, 229. 1921), error for 'LOUIS VAN HOUTTE'.
- 'LUTEO-VARIEGATA' (Weston, Bot. Univ. 1: 315. 1770, as *U. glabra luteo-varieg.*). Leaves variegated with yellow. *U. glabra*.
- 'LUTESCENS' (Dieck, Zöschen, Germany, Haupt-Cat. 1885, p. 81, as *U. campestris lutescens*; Boom, Ned. Dendr. 1: 157. 1959, as a cv.). Described at first as having gold-bronze foliage and later as having yellow leaves at least in the spring. *U. glabra*.
- 'MACROPHYLLA' (Lavallée, Arb. Segrez. 237. 1877, without description). Later described as having the largest leaves and being of very strong growth. *U. glabra*.
- 'Macrophylla' (Dieck, Zöschen, Germany, Haupt-Cat. 1885, p. 82, as *U. scabra macrophylla* Hort., not *U. campestris* var. *macrophylla* Spach, 1841) = 'PITTEURS'.
- 'MACROPHYLLA AUREA' (Bean, Kew Hand-List Trees & Shrubs, ed. 3. 273. 1925, as *U. montana* var. *macrophylla aurea*, without description). *U. × hollandica*.
- 'Macrophylla Aurea' (Späth, Berlin, Germany, Cat. 116, p. 125. 1904-05, as *U. americana macrophylla aurea*). Described as a very vigorous growing form with young shoots golden. = *U. × hollandica* 'MACROPHYLLA AUREA'?
- 'Macrophylla Fastigiata' (Nicholson, Kew Hand-List Trees & Shrubs 2: 141. 1896, as *U. montana* var. *macrophylla fastigiata* Hort., without description) = 'MAJOR'?
- 'MACULATA' (Audibert, Tonelle, France, Cat. 2, p. 53. 1831-32, as *U. scabra maculata*). Described as spotted. *U. glabra*.
- 'MAJOR' (Smith in Sowerby, English Botany 36: t. 2542. 1814, as *U. major*; Krüssmann, Handb. Laubgeh. 2: 537. 1962, as a cv.). A nothomorph of *U. × hollandica* widely planted in Britain.
- 'Major' (Loudon, Arb. Frut. Brit. 3: 1398. 1838, as *U. montana* var. *major* Masters). Described as having an "upright and rapid growth with few branches, approaching the habit of the Scotch elm but of a more tapering form." = 'SUPERBA'.

- 'Malines' (Gillekens, *Élém. Arb. Forest.* 38. 1891, as *orme de Malines*). Said to have originated about 1750 in Malines, or district; widely planted in Belgium. = 'LATIFOLIA'.
- 'MANCHU' (Stewarts Nurseries, Sutherland, Saskatchewan, Cat. 1951 [not seen]). A hardy strain raised by Mr. H. D. Stewart from seed collected by Mr. Ptitsin from near Harbin, Manchuria, and quite hardy in Saskatchewan. *U. pumila*.
- 'Marginata' (Krüssmann, *Handb. Laubgeh.* 2: 539. 1962) = 'VIMINALIS MARGINATA'.
- 'MARIJNE' (C. de Vos, *Handboek* 205. 1887, as a Dutch name for *U. sativa* [not seen]). Without description and possibly a corruption of the French 'Malines'.
- 'MARKHAM' (Peattie, *A Natural History of Trees of Eastern and Central North America* 240. 1950). A clone taken from an outstanding tree growing naturally at Avon, New York, which is now dead. As well as great size the original tree apparently possessed an extreme pendulous branching habit. *U. americana*.
- 'MARMORATA' (Dieck, Zöschen, Germany, *Haupt-Cat.* 1885, p. 81, as *U. campestris marmorata* Hort.). Described as beautifully variegated with white. The original tree in Destedter Park was said to have produced massive variegated suckers. Probably *U. carpinifolia*.
- 'MICROPHYLLA' (Loddiges, Hackney, London, Cat. 1823, p. 35, as *U. stricta microphylla*, without description). The specimen of this cultivar in Herb. Nicholson at Kew has been identified by Dr. Melville as *U. × hollandica* with leaf shape approaching *U. carpinifolia*.
- 'Microphylla Albo-dentata' (Dippel, *Hand. Laubh.* 2: 25. 1892, as *U. campestris f. microphylla albo-dentatis*) = 'ALBO-DENTATA'.
- 'Microphylla Folia Marginata' (Hartwig, *Ill. Gehölzb.* ed. 2. 391. 1892, as *U. campestris* var. *microphylla foliis marginatis* Hort.). Described as the margined small-leaved elm. = 'ARGENTEO-MARGINATA'?
- 'Microphylla Pendula' (Hartwig & Rümpler, *Ill. Gehölzb.* 580. 1875, as *U. campestris* var. *microphylla pendula* Hort., in synonymy) = 'VIMINALIS'.
- 'MICROPHYLLA PENDULA' (Kirchner in Petzold & Kirchner, *Arb. Muscav.* 561. 1864, as *U. microphylla pendula* Hort.). The tree growing under this name at Kew, is, according to Dr. Melville, a nothomorph of *U. × sarniensis* (that is *U. carpinifolia f. sarniensis* sensu Rehder).
- 'MICROPHYLLA RUBRA' (C. de Vos, *Handboek* 203. 1887, as *U. campestris microphylla rubra*, without description [not seen]). Said to be slightly different from *U. campestris microphylla purpurea*.
- 'MINNEAPOLIS PARK' (Plant Buyer's Guide, ed. 6. 285. 1958, without description). A selection made by the Minneapolis Park Department as being particularly fitted for boulevard plantings. *U. americana*.

- 'Minneapolis Park Board' (Sherman Nursery, Charles City, Iowa, Wholesale Cat., Spring 1960) = 'MINNEAPOLIS PARK'.
- 'MINOR' (Loudon, Arb. Frut. Brit. **3**: 1398. 1838, as *U. montana* var. *minor* Masters). Described as having a "more branching and spreading habit, of lower growth, with more twiggy shoots and these more densely clothed with leaves." *U. glabra*.
- 'MODIOLINA' (Dumont de Courset, Bot. Cult. **3**: 700. 1802, as *U. campestris* var. *modiolina*). "L'orme tortillard." Described as a pyramidal form of medium height with small leaves and crowded branches and by later authors as having twisted and crowded branches and gnarled stems. The Kew tree under this name has been identified by Dr. Melville as *U. × hollandica*.
- 'MOLINE' (Plant Buyer's Index, ed. 2. supplement, 1928). Originated as a wild seedling transplanted to Moline, Illinois, in 1903 and propagated from 1916; a narrow tree, when fully grown rather open, the main trunk upright but the older branches eventually horizontal. *U. americana*.
- 'Molinensis' (Bailey & Bailey, Hortus Second 746. 1941, as var. *molinensis*) = 'MOLINE'.
- 'MONSTROSA' (Lavallée, Arb. Segrez. 235. 1877, as *U. campestris* var. *monstrosa*, without description; Hartwig, Ill. Gehölzb. ed. 2. 394. 1892, as *U. scabra* var. *monstrosa* Hort.; Krüssmann, Handb. Laubgeh. **2**: 536. 1962, as a cv.). Described as a compact shrub; branchlets often fasciated, leaves 5–8 cm. long, partly pitcher shaped at the base and on a slender stalk to 2.5 cm. long. *U. glabra*.
- 'Monument' (Plant Buyer's Guide, ed. 5. 253. 1949, as *U. procera* Monument, without description) = 'MONUMENTALIS'.
- 'MONUMENTALIS' (Kirchner in Petzold & Kirchner, Arb. Muscav. 554. 1864, as *U. campestris* var. *monumentalis* Rinz). Said to be a columnar tree, with a few upright main branches and numerous short twigs bearing dense crowded dark green leaves which was propagated by Rinz at Frankfurt from a sucker of "*U. suberosa*." Possibly *U. carpinifolia* but placed by some as a synonym of 'SARNIENSIS'.
- 'MORDEN' (Patmore Nurseries, Brandon, Manitoba, Cat. 1948 [not seen]). Selected in 1939 by the Dominion Experimental Farm, Morden, Manitoba, as being able to withstand severe ice-storms without breakage; hardy, fast growing, large and strong, but rather coarse. *U. americana*.
- 'MUSCAVIENSIS' (Schneider, Ill. Handb. Laubh. **1**: 219. 1904, as *U. dippeliana* f. *muscaviensis*). Described as being larger than *U. glabra viminalis*, leaves measuring about 9 × 5 cm. *U. × hollandica*.
- 'MYRTIFOLIA' (Nicholson, Kew Hand-List Trees & Shrubs **2**: 135. 1896, as *U.*

- campestris* var. *myrtifolia* Hort., without description; Rehder in Jour. Arnold Arb. **20**: 87. 1939; Krüssmann, Handb. Laubgeh. **2**: 540. 1962, as a cv.). Leaves ovate or rhombic-ovate to oblong-ovate, 2–3(–5) cm. long, with nearly simple teeth, loosely pilose on both sides; fruit obovate, 12–15 mm. long. The specimen under this name in Herb. Nicholson at Kew has been identified by Dr. Melville as having small-leaved, juvenile-type foliage and probably being *U. carpinifolia* × *plotii* or *U.* × *hollandica*.
- ‘*Myrtifolia Purpurea*’ (Louis de Smet, Ghent, Belgium, Cat. 10, p. 59. 1877, as *U. myrtifolia purpurea*) = ‘PURPURASCENS’.
- ‘NANA’ (Loddiges, Hackney, London, Cat. 1836 [not seen]; Loudon, Arb. Frut. Brit. **3**: 1378, & **4**: 2586. 1838, as *U. campestris* var. *nana* Hort.; Krüssmann, Handb. Laubgeh. **2**: 536. 1962, as a cv.). The Bush Elm. Described as a very distinct variety not growing above 2 feet in 10–12 years. Species uncertain, the Kew bush is said by Dr. Melville to be *U. carpinifolia* × *glabra* or possibly *U.* × *hollandica*.
- ‘NEMORALIS’ (Schelle in Beissner et al., Handb. Laubh.-Benenn. **84**. 1903, as *U. campestris* f. *nemoralis* Hort., without description). Possibly *U. carpinifolia*.
- ‘NIGRA’ (Loddiges ex Loudon, Arb. Frut. Brit. **3**: 1398. 1838, as *U. montana* var. *nigra*). The Black Irish Elm. Said to have particularly deep green leaves. *U. glabra*.
- ‘NIGRESCENS’ (Pynaert in Tijdschr. Boomteelt. [Bull. Arb. Flor. Cult. Potag.] **1879**: 57. 1879, as *U. campestris betulaefolia nigrescens*). Described as having leaves like a birch and of a darker more persistent color than ‘Purpurea’. Probably *U. carpinifolia* but said to have been raised from seed of ‘Purpurea’.
- ‘Nigrescens’ (Schelle in Beissner et al., Handb. Laubh.-Benenn. **87**. 1903, as *U. americana* f. *nigrescens* Dieck, name only) = ‘NIGRICANS’.
- ‘NIGRICANS’ (Dieck, Zöschen, Germany, Haupt-Cat. 1885, p. 80). Selected from seedlings raised at the Zöschener Baumschule, distinguished by the deep dark-green color of the leaves. *U. americana*.
- ‘Nigricans’ (Bailey & Bailey, Hortus **625**. 1930, as *U. nigricans*, name in synonymy) = ‘NIGRESCENS’.
- ‘OBLONGATA’ (Koch, Dendr. **2** (1): 415. 1872, as *U. oblongata* Hort.). Described as having a broad oblong leaf without noticeable apical teeth. *U. glabra*.
- ‘Ohioensis’ (Nicholson, Kew Hand-List Trees & Shrubs **2**: 141. 1896, as *U. ohioensis* Hort., in synonymy, without description) = ‘EXONIENSIS’.
- ‘Ontariensis’ (Koch, Dendr. **2** (1): 416. 1872, as *U. ontariensis*, name in synonymy) = ‘EXONIENSIS’.
- ‘ORNATA’ (Carrière, Revue Hort. **1858**: 554. 1858, as *U. communis ornata*). Described from Toulouse and characterized as having leaves which are not

- eaten by insects whilst those of the common type are. Through the kindness of Mlle. Y. de Ferré it is understood that two individual trees still exist in the original locality, still show resistance to insect attack, and are probably two of the plants referred to by Carrière. They prove to be *U. laevis*, of which plantings had been made at that locality in the 18th century, and not *U. glabra* (*U. communis*) which had been planted to replace most of the *U. laevis*.
- 'Oxfortii' (Wesmael in Bull. Féd. Soc. Hort. Belg. 1862: 389. 1863, as *U. campestris* var. *nuda* subvar. *fastigiata oxfortii* Hort. Vilv.). Described as a pyramidal tree with the leaves not lying against the branches. Possibly = 'SARNIENSIS'.
- 'Oxoniensis' (Audibert, Tonelle, France, Cat. 2, p. 53. 1831-32, as *U. suberosa oxoniensis*, without description; Wesmael in Bull. Féd. Soc. Hort. Belg. 1862: 389. 1863, as *U. campestris* var. *nuda* subvar. *fastigiata oxoniensis* Hort. Vilv.). Described as a pyramidal tree with the leaves perceptibly lying towards the branches. Possibly an error for 'Exoniensis'.
- 'Parasol' (Koch, Dendr. 2 (1): 417. 1872, name in synonymy) = 'HORIZONTALIS'.
- 'PENDENS' (Rehder in Jour. Arnold Arb. 26: 473. 1945, as *U. parvifolia* f. *pendens*). Described as having long, loosely pendulous branches. Originated in California before 1930 from seed of the typical plant received from China. *U. parvifolia*.
- pendula* (Aiton, Hort. Kew. 1: 320. 1789, as *U. americana* var. *pendula*). Has a vase-shaped habit but with branches pendulous at their ends. This habit is part of the natural variation of *U. americana* and would seem to warrant no higher botanical rank than *forma*. It is doubtful if the original clone cultivated in Britain in 1752 still exists. It was later confused with a pendulous variant of *U. glabra*.
- 'PENDULA' (Masters, Hort. Duroverni 66. 1831, as *U. campestris pendula*, without description; Krüssmann, Handb. Laubgeh. 2: 537. 1962, as a cv.) = 'SMITHII'.
- 'Pendula' (Audibert, Tonelle, France, Cat. 2, p. 53. 1831-32, as *U. suberosa pendula*, without description) = 'PROPENDENS'.
- 'Pendula' (Loddiges, Hackney, London, Cat. 1836 [not seen]; Loudon, Arb. Frut. Brit. 3: 1398. 1838, as *U. montana* var. *pendula*; Krüssmann in Parey's Blumen-gärtn. ed. 2. 1: 519. 1958, as a cv.) = 'HORIZONTALIS'.
- 'PENDULA' (David in Revue Hort. II. 4: 101. 1845, as *U. campestris pendula*; Krüssmann, Handb. Laubgeh. 2: 540. 1962, as a cv.). Described as having small leaves with equal teeth and pendulous branches. *U. pumila*.
- 'Pendula' (Kirchner in Petzold & Kirchner, Arb. Muscav. 565. 1864, not of Loudon 1838, as *U. montana* var. *pendula*) = 'CAMPERDOWNII'.
- 'PENDULA' (C. de Vos, Handboek 20. 1887, as *U. sativa pendula* [not seen]); Boom, Ned. Dendr. 1: 158. 1959, as a cv.). Described as having slender

- pendulous branches and having been grown in Belgium in 1863. Young twigs may die back in hard winters. *U. carpinifolia*.
- 'Pendula' (Meehan, Garden & Forest 2: 286. 1889, as *U. fulva pendula*). Described as being a weeping elm and correctly identified as *U. americana* and not *U. rubra* (*U. fulva*). = 'BEEBE'S WEEPING'.
- 'Pendula Camperdownii' (Henry in Elwes & Henry, Trees Gr. Brit. Irel. 7: 1867. 1913, as *U. montana* var. *pendula camperdowni* Hort.) = 'CAMPERDOWNII'.
- 'PENDULA MACROPHYLLA' (Maxwell ex Jour. Roy. Hort. Soc. 18: 91. 1895, as *U. montana* var. *pendula macrophylla*, without description). *U. glabra*.
- 'Pendula Nova' (Kirchner in Petzold & Kirchner, Arb. Muscav. 565. 1864, as *U. montana pendula nova* Hort., name in synonymy) = 'CAMPERDOWNII'.
- 'PENDULA VARIEGATA' (Hartwig & Rümpler, Ill. Gehölzb. 583. 1875, as *U. montana* var. *pendula variegata* Hort.). Described as a form of 'Pendula' with beautiful white-variegated leaves. *U. glabra*.
- 'Pendulina' (Sinclair in Donn, Hort. Cantab. ed. 12. 110. 1831, as *U. pendulina*, without description) = 'HORIZONTALIS'?
- 'PICTURATA' (Simon-Louis, Metz, France, Cat. 1880, p. 66, as *U. picturata* Cripps). Said to differ little from 'Variegata' but with larger leaves. Probably *U. carpinifolia*.
- 'PITTEURS' (Morren in Jour. Agric. Prat. Belg. 1: 114, fig. 1848, as L'Orme Pitteurs, & Belg. Hort. 2: 133. 1852). Described as a tall tree, with very large (20 cm. long \times 18-19 cm. broad) convex rounded leaves, a little attenuate at the apex and with prominent nerves. Said to have originated in the Pitteurs estate at St. Trond, Belgium. *U. \times hollandica*.
- 'Pitteursii' (Wesmael in Bull. Féd. Soc. Hort. Belg. 1862: 382. 1863, as *U. campestris* var. *Pitteursii* Mor.; Krüssmann in Parey's Blumengärtn. ed. 2. 1: 519. 1958, as a cv.) = 'PITTEURS'.
- 'Pitteursii Pendula' (C. de Vos, Handboek, Supplement 16. 1890, as *U. Pitteursii pendula* [not seen]). According to Mr. Heijbroek the material under this name obtained by de Vos proved to be identifiable with *U. verschaffeltii*, which is a *Zelkova*.
- 'PLANEREOIDES' (Carrière in Revue Hort. 1875: 287, fig. 48. 1875, as *U. planereooides*). Described as having leaves like *Planera*. Possibly *U. carpinifolia*.
- 'PLANIFOLIA' (Loudon, Arb. Frut. Brit. 3: 1377. 1838, as *U. campestris* var. *planifolia* Hort.). Described as "a handsome small tree, closely resembling *U. campestris* var. *parvifolia*" (i.e. *U. parvifolia* Jacq.). Species uncertain and probably now extinct.
- 'Plumosa' (C. de Vos, Woordenboek 136. 1867, as *U. plumosa*) = 'EXONIENSIS'.

- 'Praestans' (Beterams in Mitt. Deut. Dendr. Ges. **20**: 250. 1911, as *U. praestans*) = 'MAJOR'.
- 'Primus' (Sarcoxie Nurseries, Sarcoxie, Missouri, U. S. Plant Patent No. 1747, July 1958, as 'Improved Coolshade variety Primus') = 'IMPROVED COOLSHADE'.
- 'PRINCETON' (Princeton Nurseries, New Jersey, Cat. 1934, p. 107). Originally selected in 1922 by Princeton Nurseries for the large healthy foliage, usually vigorous growth habit and resistance to Elm Leaf Beetle. Vase type similar to 'Moline' but with a slightly more spreading top. *U. americana*.
- 'PROPENSUS' (Schneider, Ill. Handb. Laubh. **1**: 220. 1904, as *U. glabra* var. *suberosa* f. *propensus*; Krüssmann, Handb. Laubgeh. **2**: 535. 1962, as a cv.). Described as "a form of var. *suberosa* with pendulous branches." *U. carpinifolia*.
- 'Propensus Lombarts' (Lombarts, Zundert, Netherlands, Cat. 1955-56, p. 85, as *U. procera* 'propensus Lombarts'). = 'LOMBARTSII'.
- 'PULVERULENTA' (Dieck, Zöschchen, Germany, Haupt-Cat. 1885, p. 82, as *U. scabra viminalis pulverulenta* Hort., without description; Dippel, Handb. Laubh. **2**: 30. 1892). Described as having the leaves streaked with white and yellow. *U. × viminalis* (that is *U. procera* var. *viminalis* sensu Rehder).
- 'PUMILA' (Loddiges, Hackney, London, Cat. 1823, p. 35, as *U. montana pumila*, not *U. pumila* L., without description). Species unknown and probably extinct.
- 'Punctata' (Simon-Louis Nurseries, Metz, France, Cat. 1886-87, p. 60, as *U. campestris punctata*). Described as having spotted leaves. = *U. carpinifolia* 'VARIEGATA'?
- 'PUNCTATA' (Schelle in Beissner et al., Handb. Laubh.-Benenn. 87. 1903, as *U. effusa* f. *punctata* Hort., without description; Schneider, Ill. Handb. Laubh. **1**: 213. 1904). Described as having leaves flecked with white. *U. laevis*.
- 'PUNCTATA' (Schelle in Beissner et al., Handb. Laubh.-Benenn. 87. 1903, as *U. (elliptica?) punctata* Hort., without description). Species doubtful.
- 'Punctata' (Schelle in Beissner et al., Laubh.-Benenn. 83. 1903, as *U. campestris punctata* Hort., without description). = 'ARGENTEO-VARIEGATA'.
- 'Purple Leaf' (Plant Buyer's Guide, ed. 5. 253. 1949, as *U. procera* Purple Leaf, without description) = 'PURPUREA'.
- 'PURPURASCENS' (Lavallée, Arb. Segrez. 236. 1877, as *U. campestris* var. *purpurascens*, without description; Schneider, Ill. Handb. Laubh. **1**: 220. 1904; Krüssmann, Handb. Laubgeh. **2**: 540. 1962, as a cv.). Said to have leaves about 1 inch long tinged with purple or purplish when young, dark green later, and normally remaining a shrub. Possibly *U. carpinifolia*.
- 'PURPUREA' (Wesmael in Bull. Féd. Soc. Hort. Belg. **1862**: 390. 1863, as *U. campestris* var. *purpurea* Hort. Vilv.; Krüssmann in Parey's Blumengärtn. ed. 2.

- 1: 519. 1958, as a cv.). Described as having the leaves tinged with dark purple-brown when unfolding and reddish-green later. Cultivated in Belgium by 1863. Probably *U. carpinifolia*.
- 'Purpurea Corylifolia' (Dieck, Zöschen, Germany, Haupt-Cat. 1885, p. 82, as *U. scabra purpurea corylifolia* Hort., without description) = 'CORYLIFOLIA PURPUREA'.
- 'Purpurea Nigricans' (Dieck, Zöschen, Germany, Haupt-Cat. 1885, p. 82, as *U. scabra purpurea nigricans* Hort., without description) = 'LATIFOLIA NIGRICANS'.
- 'PYRAMIDALIS' (Audibert, Tonelle, France, Cat. 2, p. 53. 1831-32, as *U. campestris pyramidalis*. Referred to as pyramidal. Possibly *U. carpinifolia*.
- 'Pyramidalis' (Wesmael in Bull. Féd. Soc. Hort. Belg. 1862: 387. 1863, as *U. americana* var. *pyramidalis* Hort.) = 'PYRAMIDATA'.
- 'Pyramidalis' (C. de Vos, Woordenboek 137. 1867, as *U. pyramidalis*) = *U. angustifolia* var. *cornubiensis* (*U. carpinifolia* var. *cornubiensis*).
- 'Pyramidalis' (Lavallée, Arb. Segrez. 237. 1877, as *U. montana* var. *pyramidalis*, without description) = 'DAMPIERI'.
- 'Pyramidalis' (Lavallée, Arb. Segrez. 236. 1877, as *U. suberosa* var. *pyramidalis*, without description) = 'SARNIENSIS'.
- 'PYRAMIDALIS' (Gibbs in Gard. Chron. III. 71: 227. 1922, as *U. campestris pyramidalis*). A pyramidal tree originating from a sport at Aldenham about 1890. *U. procera*.
- 'PYRAMIDALIS BERTINII' (Lavallée, Arb. Segrez. 236. 1877, as *U. campestris* var. *pyramidalis Bertini*, without description). Possibly *U. carpinifolia*.
- 'PYRAMIDALIS FIOREI' (Charles Fiore Nurseries, Prairie View, Illinois, Cat. Spring 1957, p. 27). Described as being strictly pyramidal in form, selected from a plant in nursery grounds at Prairie View about 1950. *U. pumila*.
- 'PYRAMIDATA' (Baudriller, Angers, France, Cat. 43, p. 116. 1880, as *U. americana* *pyramidata*). Described as pyramidal. *U. americana*.
- 'QUEEN CITY' (Sheridan Nurseries, Sheridan, Ontario, Cat. 1949, p. 34). Selected about 1944, the original tree growing on the Lake Shore Blvd., Toronto; a very symmetrical vase-shaped, densely branched tree, the lateral branches spreading horizontally, and with a rather smooth bark. *U. americana*.
- 'RAMULOSA' (Loudon, Arb. Frut. Brit. 3: 1405. 1838, as *U. (montana) glabra* var. *ramulosa* Booth, without description). *U. glabra*.
- 'Replicata' (Masters, Hort. Duroverni 67. 1831, as var. *replicata*, name in synonymy, without description) = 'EXONIENSIS'.
- 'ROSEHILL' (Willis Nursery Co., Ottawa, Kansas, Cat. Fall 1958 - Spring 1959, p. 18. 1958). A hybrid of *U. pumila* and *U. rubra*. A selection made in 1951

- and described as growing a little more slowly than 'Willis' but carrying a heavier crown for the height, also that it branches well and has very attractive foliage. Raised by Rose Hill Nurseries, Kansas City, Missouri.
- 'Rosselsii' (Schelle in Beissner et al., Handb. Laubh.-Benenn. 83. 1903, as *U. campestris* var. *Rosselsii* Hort.). Mistake for *Rosseelsii*. = *U. × viminalis* 'AUREA'.
- 'Rosseelsii' (Koch, Dendr. 2 (1): 412. 1872, as *U. Rosseelsii*, name in synonymy) = *U. × viminalis* 'AUREA'.
- 'ROTUNDIFOLIA' (Mottet in Nicholson & Mottet, Dict. Prat. Hort. 5: 383. 1898, as *U. campestris* var. *rotundifolia* Hort.). Described as having leaves rounded, oval or suborbicular. Possibly *U. carpinifolia*.
- 'Rubescens' (Schwerin in Mitt. Deut. Dendr. Ges. 20: 423. 1911, as *U. effusa rubescens*). Described as having leaves which turn a beautiful blood-red in the autumn. = *U. laevis* 'COLORANS'? (*U. campestris* var. *rubescens* Herder in Gartenflora 20: 347. 1871, is possibly an earlier publication of this cultivar under the name of another species).
- 'RUBRA' (Simon-Louis, Metz, France, Cat. 1869, p. 97, as *U. campestris rubra*; Krüssmann, Handb. Laubgeh. 2: 536. 1962, as a cv.). Distinguished by the inner bark of young branchlets deep red. *U. glabra*.
- 'RUEPPELLII' (Späth, Berlin, Germany, Cat. 73, p. 124. 1888-1889, as *U. campestris Rueppelli*; Krüssmann, Handb. Laubgeh. 2: 535. 1962, as a cv.). Described as a pyramidal tree with a distinct stem and numerous ascending branches forming a globose or ovoid crown. *U. carpinifolia*.
- 'RUFa' (Dieck, Zöschen, Germany, Haupt-Cat. Nachtrag I. 1887, p. 28, as *U. campestris* f. *rufa*, without description). Possibly *U. carpinifolia*.
- 'RUGOSA' (Audibert, Tonelle, France, Cat. 1817, p. 23, as *U. campestris* var. *rugosa*, without description; Hartwig & Rümpler, Ill. Gehölzb. 583. 1875, as *U. montana* var. *rugosa* Hort.). Described as having very hard, roughly harsh, somewhat folded leaves, and as being pramidal and thick bushy. *U. glabra*.
- 'RUGOSA' (Loudon, Arb. Frut. Brit. 3: 1398. 1838, as *U. montana* var. *rugosa* Masters). Described as having "dark reddish-brown bark, cracking into short regular pieces, very like *Acer campestris*; a tree of spreading growth and moderate size." Possibly different from the previous cultivar. *U. glabra*.
- 'Rugosa Pendula' (Kirchner in Petzold & Kirchner, Arb. Muscav. 566. 1864, as *U. rugosa pendula* Hort., name in synonymy) = 'PROPENDENS'.
- 'SARNIENSIS' (Loddiges, Hackney, London, Cat. 1836 [not seen]; Boom, Ned. Dendr. 1: 158. 1959, as a cv.). The Jersey, Guernsey or Wheatley Elm. Usually treated as a variety of *U. carpinifolia*; Dr. Melville believes it is more correctly considered as a hybrid between *U. angustifolia* and *U. × hollandica*, for which the botanical name would be *U. × sarniensis* (Loud.) Bancroft. However the original clone may still be called cultivar 'Sarniensis'.

- 'SCAMPSTONIENSIS' (Kirchner in Petzold & Kirchner, Arb. Muscav. 560. 1864, as *U. glabra* var. *Scampstoniensis* Loud.). The Scampston Elm. Originated at Scampston Hall, Yorkshire, England, before 1810. A quick growing, weeping form possibly no longer in existence. Probably a form of *U. × hollandica*.
- 'Scampstoniensis Pendula' (Kirchner in Petzold & Kirchner, Arb. Muscav. 560. 1864, as *U. Scampstoniensis pendula*). Said to be of a very beautiful weeping habit but scarcely different from *U. montana pendula* = *U. glabra* 'PENDULA'?
- 'SCHUURHOEK' (Van 't Westeinde, Holland, Cat. 27, p. 28. 1957-58 [not seen]). An old, nameless clone growing in several places around Goes, Holland, retaken into cultivation and named by Van 't Westeinde. Of high growth, the trunk being covered with not-too-heavy branches over its whole length, and resistant to exposure. *U. carpinifolia*.
- 'SEMPERVIRENS' (Bailey & Bailey, Hortus Second 747. 1941). Said to be an evergreen form of the Chinese Elm, but can be deciduous or evergreen depending upon the climate. *U. parvifolia*.
- 'SERICEA' (Lavallée, Arb. Segrez. 236. 1877, as *U. campestris* var. *sericea*, without description). Possibly *U. carpinifolia*.
- 'SERPENTINA' (Koch, Dendr. 2 (1): 417. 1872, as *U. serpentina*, name in synonymy; Krüssmann, Handb. Laubgeh. 2: 536. 1962, as a cv.). Given by Koch as a synonym of 'Pendula'. Plants with this name at Kew have been identified by Dr. Melville as *Ulmus glabra* introgressed by *U. carpinifolia* and distinct from 'Camperdownii'. It is said to have more pronounced zig-zag twigs.
- 'Siber-Ansaloni' (Ansaloni Nurseries, Bologna, Italy, Cat. 1946-47, p. 28) = 'ANSALONI'.
- 'Siberica' (Lavallée, Arb. Segrez. 237. 1877, as *U. sibirica* Hort., in synonymy, without description) = *U. pumila* 'PENDULA'.
- 'SMITHII' (Henry in Elwes & Henry, Trees Gr. Brit. Irel. 7: 1868. t.412, fig. 24. 1913, as *U. Smithii*). The Downton Elm, first named as such by Sabine (ex Knight in Trans. Hort. Soc. Lond. 5: 146. 1824, as the *Downton Elm*). Raised in 1810 in Smith's Nursery at Worcester from seed obtained from a tree in Nottinghamshire. Some seedlings were purchased by Mr. Knight of Downton Castle of which one turned out to be pendulous. It has the habit of ascending branches but pendulous branchlets. *U. × hollandica*.
- 'SOWERBYI' (Moss, Cambr. Brit. Fl. 2: 90. 1914, as *U. nitens* var. *sowerbyi* Moss). Described as a smaller tree than var. *Hunnybunii*, the branches shorter and the upper ones very tortuous; leaves smaller and acute; often planted. *U. carpinifolia*.
- 'SPECTABILIS'. Appeared about 1915 in Pallesens Nursery, Kolding, Denmark. Selected for its extremely rapid growth in the first two or so years but this characteristic lessened as the plants grew older, and it seems to have dropped out of cultivation. *U. glabra*.

- 'STAR' (Plumfield Nurseries, Fremont, Nebraska, Wholesale Cat. 1957 [not seen]). Selected about 1945, as grafts from a local tree of compact growth and much branched, globe-shaped head. *U. americana*.
- 'Striata' (Audibert, Tonelle, France, Cat. 2, p. 53. 1831-32, as *U. campestris striata*). Possibly a typographic error = 'STRICTA'.
- 'STRICTA' (Audibert, Tonelle, France, Cat. 1817, p. 23, as *U. campestris* var. *stricta*). Described as of very rigid growth. A specimen under this name in Herb. Nicholson at Kew has been identified by Dr. Melville as *U. × viminalis*.
- suberosa* (Moench, Verz. Baume Weissenst. 136. 1785, as *U. suberosa*). Said to differ chiefly in the corky-winged branches but this is a juvenile character which occurs here and there in otherwise unrelated populations of *U. carpinifolia* and related elms and is inapplicable, along with *fungosa*, and possibly *alata*, as the name of a clone or cultivar.
- 'Suberosa Alata' (Kirchner in Petzold & Kirchner, Arb. Muscav. 556. 1864, as *U. campestris* var. *suberosa alata* Hort.). Described as having corky pendulous branches = 'PROPENDENS'.
- 'Suberosa Pendula' (Audibert, Tonelle, France, Cat. 1831-32, p. 53, as *U. suberosa pendula*, without description; Späth, Berlin, Germany, Cat. 69, p. 9. 1887, as *U. campestris suberosa pendula* Hort.) = 'PROPENDENS'.
- 'SUBEROSA TORTUOSA' (Schelle in Beissner et al., Handb. Laubh.-Benenn. 84. 1903, as *U. campestris* var. (?) *suberosa tortuosa* Hort., without description). *U. carpinifolia*?
- 'SUBEROSA VARIEGATA' (Hartwig & Rümpler, Ill. Gehölzb. 579. 1875, as *U. campestris* var. *suberosa variegata* Hort.). Described as having leaves with very white streaks. Possibly a cultivar of *U. carpinifolia* or *U. × viminalis*, see comments under *U. carpinifolia* 'Variegata'.
- 'Sublaciniatus' (Mathieu, Fl. Gén. Belg. 1: 480. 1853, as *U. campestris* var. *sublaciniatus*) = 'CRISPA'.
- 'SUPERBA' (Morren in Jour. Agric. Prat. Belg. 1: 411. 1848, as *U. montana* var. *superba*; Krüssmann, Handb. Laubgeh. 2: 537. 1962, as a cv.). Raised in Masters Nursery near Canterbury, probably early in the 19th century, and referred to as Master's Canterbury seedling; later known by the epithet *major* (but not that of Smith). *U. × hollandica*.
- 'Superba' (Lavallée, Arb. Segrez. 237. 1877, as *U. montana* var. *superba*, name in synonymy) = 'CORNUTA'.
- 'Tabletop' (Plant Buyer's Guide, ed. 5. 253. 1949, as *U. glabra* Tabletop, without description) = 'HORIZONTALIS'.
- 'TILIAEFOLIA' (Host, Fl. Austr. 1: 329. 1827, as *U. tiliaefolia*). Said to be a form with ovate leaves, rounded or subcordate, and usually not strongly oblique at the base. *U. glabra*.

- 'TOMENTOSA' (Kirchner in Petzold & Kirchner, Arb. Muscav. 566. 1864, as *U. tomentosa* Hort.). Later described as having the undersides of leaves with thick, soft, hairs giving a pronounced gray-green appearance. *U. glabra*.
- 'TORTUOSA' (Host, Fl. Austr. 1: 330. 1827, as *U. tortuosa*). Described as having a trunk and branches which zig-zag. *U. carpinifolia*.
- 'TRICOLOR' (C. de Vos, Woordenboek 137. 1867, as *U. suberosa tricolor*). Described as beautifully silver-variegated, the leaves near the top of growing branches colored red, but not a vigorous grower. *U. × hollandica*.
- 'Tricuspis' (Koch, Dendr. 2 (1): 415. 1872, as *U. tricuspis* Hort.) = 'CORNUTA'.
- 'Tridens' (Hartig, Vollst. Naturg. Forstl. Culturpfl. 460. 1850, as *U. tridens*) = 'CORNUTA'.
- 'Triserrata' (Kirchner in Petzold & Kirchner, Arb. Muscav. 567. 1864, as *U. triser-rata* Hort.) = 'CORNUTA'.
- 'Turkestanica' (Regel in Gartenflora 33: 28. 1884, as *U. turkestanica*, without description) = 'UMBRACULIFERA'.
- 'UMBRACULIFERA' (Trautvetter in Act. Hort. Petrop. 2: 590. 1873, as *U. campestris* var. *umbraculifera*; Boom, Ned. Dendr. 1: 158. 1959, as a cv.). A tree with a dense globose head, introduced to European gardens from Persia [?], before 1878. *U. carpinifolia*.
- 'UMBRACULIFERA GRACILIS' (Späth, Berlin, Germany, Cat. 100, p. 121. 1897-98, as *U. campestris umbraculifera gracilis*). Described as a form of var. *umbraculifera* forming a long oval and not a globose crown, also with slenderer, more crowded branches and smaller leaves. Originated in Späth's nursery in Berlin, as a shoot from 'Umbraculifera'. *U. carpinifolia*.
- 'Urnii' (Siebenthaler Co., Dayton, Ohio, Cat. 122, p. 15. 1931, as *U. urni*, without description). See 'Vase'.
- 'Urticaefolia' (Audibert, Tonelle, France, Cat. 2, p. 53. 1831-32, as *U. urticaefolia* = 'CRISPA'.
- 'URTICAEOFOLIA' (Jacques in Revue Hort. 2: 128. 1832, as in *U. urticaefolia*). Described as having deeply toothed leaves, the teeth unequal and very pointed. Raised as a chance seedling by Jacques in 1830, now probably lost from cultivation. *U. laevis*.
- 'Van Houttei' (Schelle in Beissner et al., Handb. Laubh.-Benenn. 86. 1903, as *U. montana lutescens van Houttei* Hort., without description) = 'LOUIS VAN HOUTTE'.
- 'VARIEGATA' (Dumont de Courset, Bot. Cult. 3: 700. 1802, as *U. campestris* var. *glabra variegata*; Boom, Ned. Dendr. 1: 158. 1959, as a cv.). Described as having leaves spotted with white, especially near the margins. Said to have been

cultivated in France in 1772. Variegated forms arise frequently and several clones may have been known under this name, most of them *U. carpinifolia*, but variegated forms of *U. × vejeta* have also been known by this name.

'Variegata' (Loudon, Arb. Frut. Brit. 3: 1405. 1838, as *U. (montana) glabra* var. *variegata*). Described as having variegated leaves. = *U. glabra* 'ALBO-VARIEGATA'?

'Variegata' (Wesmael in Bull. Féd. Soc. Hort. Belg. 1862: 390. 1863, as *U. campestris* var. *nuda* subvar. *microphylla variegata* Hort. Vilv.). Described as having the leaves spotted with white. *U. carpinifolia*, possibly = 'VARIEGATA'.

'VARIEGATA' (Wesmael in Bull. Féd. Soc. Hort. Belg. 1862: 387. 1863, as *U. americana* var. *variegata* Hort.). Described as having leaves spotted with white. *U. americana*.

'Variegata' (Lee ex Jour. Roy. Hort. Soc. 6: cxxix. 1880, as *U. campestris variegata*). Described as having leaves like those of *Ficus Parcellii*, i.e., marked with a creamy-white mosaic. Probably = 'ARGENTEO-VARIEGATA'.

'Variegata' (Dippel, Handb. Laubh. 2: 25. 1892, as *U. campestris* var. *variegata* Hort.) = 'ARGENTEO-VARIEGATA'.

'Variegata' (Bean, Kew Hand-List Trees & Shrubs, ed. 3. 272. 1925, as *U. major* var. *variegata*, without description) = 'ELEGANTO-VARIEGATA'.

'VARIEGATA NOVA' (Nicholson, Kew Hand-List Trees & Shrubs 2: 137. 1896, as *U. campestris* var. *variegata nova* Hort., without description; Henry in Elwes & Henry, Trees Gr. Brit. Irel. 7: 1895. 1913). Said to bear "leaves which are often much reduced in size and entirely whitish. Occasionally branches are produced bearing leaves of normal size with the variegation confined to the margin and one or two branches with green leaves." Possibly *U. carpinifolia*.

'Vase' (Plant Buyer's Guide, ed. 5. 253. 1949, as *U. americana* Vase, without description). The name for a growth form neither clonal nor a true cultivar. *U. americana*.

'Vaseyi' (Bailey & Bailey, Hortus Second 747. 1941, as *U. vaseyi*) = 'Vase' (which see).

'VEGETA' (Lindley in Donn, Hort. Cantab. ed. 10. 193. 1823, without description; Krüssmann in Parey's Blumengärtn. ed. 2. 1: 519. 1958, as a cv.). The Huntingdon or Chichester Elm, said to have originated at Wood & Ingrams Nursery at Huntingdon, in England, about the middle of the 18th century. Considered by Dr. Melville as a hybrid of *U. carpinifolia* × *glabra* for which it is the earliest epithet, but treated by Rehder and others as a variety of the hybrid *U. × hollandica*. The widespread clone may be known as *Ulmus* 'Vegeta' in either case.

'VIMINALIS' (Masters, Hort. Duroverni 66. 1831, as *U. campestris viminalis*, without description; Boom, Ned. Dendr. 1: 158. 1959, as a cv.). Described as

a tree with ascending branches but pendulous branchlets, slightly pubescent while young; leaves obovate to narrow-elliptic, 2–6 cm. long, acuminate, incised doubly serrate, scabrous above, slightly pubescent beneath. Said to have been raised by Mr. Masters in 1817. Usually treated as a variety of *U. procera* but according to Dr. Melville this is of hybrid origin: *U. carpinifolia* × *plotii*, and is the correct epithet for this hybrid, as *U. × viminalis*. However the original clone may still be known as *Ulmus* 'Viminalis'.

'Viminalis Argentea' (Hillier, Winchester, England, Cat. 2P, p. 100. 1938, as *U. viminalis argentea*). Described as having leaves variegated with silver. *U. × viminalis* (that is *U. procera* var. *viminalis* sensu Rehder).

'Viminalis Aurea' (Henry in Elwes & Henry, Trees Gr. Brit. Irel. 7: 1907. 1913, as *U. campestris* var. *viminalis aurea*) = *U. × viminalis* 'AUREA'.

'Viminalis Gracilis' (Dieck, Zöschen, Germany, Haupt-Cat. 1885, p. 82, as *U. scabra viminalis gracilis* Hort., without description) = 'VIMINALIS'.

'VIMINALIS MARGINATA' (Kirchner in Petzold & Kirchner, Arb. Muscav. 556. 1864, as *U. campestris* var. *viminalis marginata* Hort.). Said to be a form of 'Viminalis' with the leaves variegated with creamy white near the margin.

'Viminalis Marmorata' (Schelle in Beissner et al., Handb. Laubh.-Benenn. 85. 1903, as *U. montana viminalis marmorata* Hort., without description) = 'PULVERULENTA'.

'Viminalis Pendula' (Masters in Jour. Roy. Hort. Soc. 13: 90. 1891, as *U. viminalis pendula*, without description) = 'VIMINALIS'.

'Viminalis Pulverulenta' (Hartwig, Ill. Gehölzb. ed. 2. 394. 1892, as *U. scabra* var. *viminalis pulverulenta* Hort.). Described as the pulverulent 'Viminalis'. = 'PULVERULENTA'.

'VIMINALIS STRICTA' (Boulger in Gard. Chron. II. 12: 298. 1879, as *U. campestris viminalis stricta* Loudon, without description).

'Viminalis Superba' (Schelle in Beissner et al., Handb. Laubh.-Benenn. 85. 1903, as *U. campestris viminalis superba* Hort., name in synonymy, without description) = 'VIMINALIS MARGINATA'.

'Viminalis Variegata' (Lee ex Jour. Roy. Hort. Soc. 18: 90. 1895, as *U. viminalis variegata*, without description) = 'VIMINALIS MARGINATA'.

'VIRENS' (Masters, Hort. Duroverni 66. 1831, as *U. virens*, without description; Loudon, Arb. Frut. Brit. 3: 1376. 1838, as *U. campestris* var. *virens*). The Kidbrook Elm. Described as being almost evergreen in a mild winter; the bark is red and the tree of a spreading habit. *U. × hollandica*.

'VIRGATA' (Pépin in Revue Hort. 1865: 347. 1865, as *U. campestris virgata* and *U. virgata*). Described as having slender, erect branches giving the tree a fastigiate shape. Planted before 1789 near Nangis, Seine-et-Marne. *U. carpinifolia*.

- '*Virginalis*' (Lavallée, Arb. Segrez. 235. 1877, as *U. campestris* var. *virginalis*, name in synonymy) = 'VIMINALIS'.
- '*Viscosa*' (Loddiges, Hackney, England, Cat. 1836 ex Loudon, Arb. Frut. Brit. 3: 1378. 1838, as *U. viscosa*). Leaves rather large and dark green, with some anthocyanin pigment. An early specimen in Herb. Dumortier named *U. viscosa* Audibert has been identified by Dr. Melville as *U. × hollandica*.
- 'WASHINGTON' (Anon. ex Dame, Typical Elms & Other Trees of Mass. 25. 1890; Jack, Bull. Pop. Inf. Arnold Arb. III. 5: 69. 1931, as the "Washington Elm"). Not distinguished morphologically but clonally propagated and distributed from the tree (now dead) under which George Washington is reputed to have taken command of the Colonial Troops at Cambridge, Massachusetts, in 1775. *U. americana*.
- 'WEBBIANA' (Lee ex Simon-Louis, Metz, France, Cat. 1869, p. 97, as *U. campestris Webbiana*; Krüssmann, Handb. Laubgeh. 2: 535. 1962, as a cv.). Said to be a form of the Cornish Elm with leaves folded longitudinally, and to have been raised in Lee's nursery about 1868, but possibly to be placed with *U. × hollandica* along with '*Viscosa*'.
- 'Wendworthii' (Schelle in Beissner et al., Handb. Laubh.-Benenn. 84. 1903, as *U. campestris Wendworthii* Hort., without description) = 'WENTWORTHII PENDULA'.
- 'Wentworthiensis' (Späth, Berlin, Germany, Cat. 143, p. 135. 1910-11, as *U. campestris wentworthiensis*) = 'WENTWORTHII PENDULA'.
- 'Wentworthii' (Dippel, Handb. Laubh. 2: 24. 1892, as *U. campestris Wentworthii*) = 'WENTWORTHII PENDULA'.
- 'WENTWORTHII PENDULA' (C. de Vos, Handboek, Supplement, 16. 1890, as *U. Wentworthii pendula* [not seen]). De Vos suggests it belongs in *U. × hollandica* but the Kew tree under this name has been identified by Dr. Melville as *U. × vegeta*.
- 'Wheatley' (Plant Buyer's Guide, ed. 5. 253. 1949, as *U. procera* Wheatley, without description) = 'SARNIENSIS'.
- 'Wheatleyi' (Simon-Louis, Metz, France, Cat. 1869, p. 98 [not seen]) = 'SARNIENSIS'.
- 'WILLIS' (Willis Nursery Co., Ottawa, Kansas, Cat. Fall 1958-Spring 1959, p. 18. 1958). Probably a hybrid of *U. pumila* and *U. rubra*, although at first thought to be *U. americana* × *U. pumila*. A selection made by Mr. Minnick of Kansas City and first referred to as "Hybrid." Described as having a smooth gray bark on young trees, large leaves resembling those of *U. americana*, and as being of very rapid growth.
- 'WREDEI' (Jühlke in Hamburg Gart.- & Blumenzeit. 33: 485. 1877, as *U. Dampieri* var. *Wredei*; Krüssmann in Parey's Blumengärtn. ed. 2. 1: 519. 1958, as a cv.).

Described as a yellowish-leaved variant of 'Dampieri'. Originated in 1875 at the Arboretum at Alt-Geltow, near Potsdam, Germany. It may be a chimaera as it often develops green twigs which are identical with 'Dampieri'. The Kew tree of this name has been identified by Dr. Melville as *U. × hollandica*.

'Wreedi Aurea' (Leach ex Jour. Roy. Hort. Soc. **16**: lxi. 1893, as *U. Wreedi aurea*) = 'WREDEI'.

'YPRÉAU' (Poederlé, Man. Arb. For. Belg. 266. 1772, as *l'Orme Ypreau*). Also called l'orme-teille, Orme-tilleul and lindolm, each translatable as the *Tilia*-like elm. Formerly much planted in the region of Ypres in Belgium. This name has since become the subject of much confusion, involving two elms, a poplar, and a willow (see Huberty in Bull. Soc. Centr. For. Belg. **11**: 571. 1904). *U. × hollandica*.

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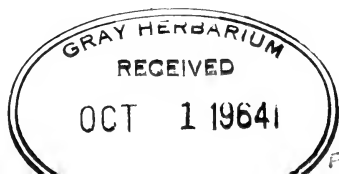
NUMBER 9

THE CHINESE BUSH CHERRY — *PRUNUS TOMENTOSA*

FOR over a century northeastern China has served as an experimental garden from which visiting explorers have selected ornamental flowering and fruiting plants for use in North America. One plant well known in the gardens of north China has been tried in North America but not in other temperate areas. Even in the United States it has dropped from serious consideration, yet it does deserve a re-examination.

The Chinese bush cherry, *Prunus tomentosa*, has a natural distribution from Korea through northern and western China and Tibet into the northern Himalayan portion of India. Long ago it was introduced into Japan and it was from one plant in Japan that Thunberg described the species as the downy cherry. Being both hardy and useful, its cultivation was increased until today it occurs through the whole of the Russian Far East including Amurland and Transbaikalia, into northern Kazakhstan and the mountainous regions of western China. In Manchuria *Prunus tomentosa* has escaped from cultivation into the Liaotung Peninsula and it is found spontaneous along roads in the area surrounding Kirin or east of Harbin. The Chinese have called this plant ying-t'ao (cherry), while in Manchuria it is known as the Shanghai cherry, in Amurland as the "ando cherry." Around Peking it is the "mountain cherry" while the introduced plants have been named Manchu cherry, Nanking cherry, Chinese bush cherry or Chinese dwarf cherry in the U.S. and in Canada. The Russian horticulturist Skvortzov suggested "Chinese cherry" as the most appropriate name but Woeikoff preferred a direct translation of its scientific name and used "downy cherry."

In the northern parts of Asia *Prunus tomentosa* is an important fruiting shrub. It tolerates cold and dry climates in areas where the winters are long and snowless and the temperatures regularly reached 31° F below zero. Grown near or in the protection of houses, the plant is long-lived and fruitful. Generally it is a vigorous twiggy shrub which becomes wider than tall in outline and averages 5-6 ft. in height. The dark reddish black bark is lustrous and the young branches



and leaves densely soft tomentose pubescent. The flower buds open before the leaves, are white or pink with a red calyx, and are borne in clusters on bright red pedicels. The regular habit of annual flowering coupled with its dependable profusion of blossoms makes *Prunus tomentosa* a conspicuous and a desirable ornamental shrub. The flowers are followed by fruits which are equally abundant, generally globose but rarely oblong in outline. In wild plants one quarter to one half inch is the average fruit size but strains have been reported with fruits to one inch in diameter. In Asia the plants are valued for the abundance of fruit, sweet yet tart, brilliant in color, maturing in July and with moderate keeping qualities. As a cultivated plant it does best on well drained soils which are slightly acid and in locations which are protected. Frost damage is common to this plant in Asia when it is grown in wet areas and poor results can be expected in alkaline locations. It is, however, the most tolerant of drought of all the cherries.

The first introduction of this species to the United States is credited to the Arnold Arboretum in 1882 when Bretschneider sent seeds collected in the area of Peking to Charles Sargent. The United States Department of Agriculture records of plant introductions list 49 introductions of *Prunus tomentosa* and its varieties between 1903 (39201) and 1953 (207515), the latest listing available. Thirty-three of these introductions were from outside North America, e.g., Tokyo, China, Chinese Turkestan, Italy, Manchuria, Korea, India and Afghanistan. In addition, there have been introductions by arboreta, state departments of agriculture, and private nurserymen in the U.S. and in Canada which are not recorded in the USDA lists. Considering these many introductions, the present record of the distribution of *Prunus tomentosa* in cultivation in the U.S. is incomplete. A check of five major herbaria reveals specimens only from plants cultivated in the New England states, New York, Pennsylvania, Ohio, Illinois, Georgia and California. The species is also offered only by nurserymen in these same states, yet unsubstantiated distribution records in various publications cite Iowa, Minnesota, the Dakotas and Montana as areas of cultivation. In Canada the species has been grown in Alberta, Saskatchewan, Manitoba, Ontario, Quebec and Labrador, but recent information supplied by F. L. Skinner and W. A. Cumming indicates that only selected strains are to be recommended for such areas as Saskatchewan and Alberta. The work of these men indicates that seedlings from stock obtained in northern Manchuria are more suitable for Canadian horticulture than plants originating from farther south in Asia.

After its first introductions, the Chinese bush cherry seemed assured of a real place in American horticulture. It was praised in many horticultural magazines by many writers and in 1931 H. Lloyd Haupt, editor of the National Nurseryman, devoted editorial comment and most of the text of the issue of January 15th to the praise of this species. Haupt was so sure of the future of *Prunus tomentosa* that he noted the many introductions and suggested, "Just who is going to take the final credit is hard to say."

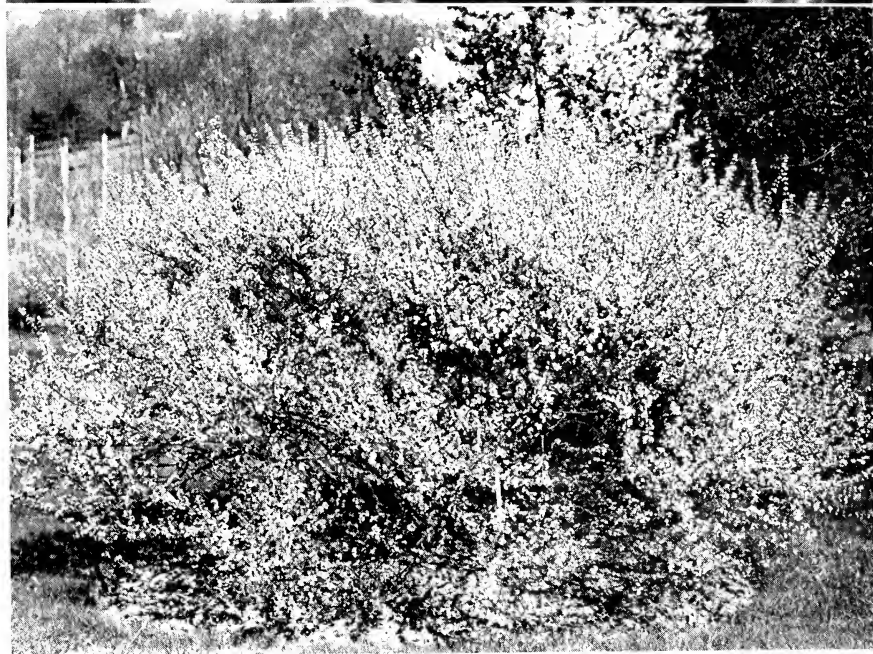


PLATE VIII

Top: *Prunus tomentosa*, fruiting branch. Bottom: *Prunus tomentosa* in flower.

The horticultural uses of *Prunus tomentosa* are numerous and varied. In the Boston area it is one of the earliest flowering cherries, blooming at the end of April. The plants grow well as specimen plants or in a group. Although records are available of plants 30 to 50 years of age in Manchuria, the experience in the Boston area indicates the plant has outlived its attractiveness in 20 or 25 years. A Wilson introduction of 1907 is still alive in our collections and propagations from the original Bretschneider introduction are maintained. The oldest single specimen is in Highland Park, Rochester, New York, and is a plant obtained from the Arnold Arboretum in 1892. In 1931 Haupt reported this plant as 8 feet tall and 25 feet in diameter and Harkness (Plants and Gardens 19: 13. 1963) indicated the correct size is today 10 by 12 feet. He also suggested its longevity and vigor may have been aided by the fact that it has never borne fruit. *Prunus tomentosa* is grown as a hedge plant in Manchuria and is used also as a wind break. At the Arnold Arboretum hedge test plots, *Prunus tomentosa* has not proven successful when subjected to pruning twice a year. Gerling's illustration (Plants and Gardens 19: 33. 1963) of the Nanking Cherry as an upright branching tree is certainly the result of pruning.

Although varieties of *Prunus tomentosa* have been described often on minor botanical characteristics, some of these must be considered as cultivars.

Prunus tomentosa 'Graebneriana'. Described by Koehne (Plantae Wilsonae 2: 268-79. 1912) as a botanical variety but based on material cultivated near the botanical garden of Berlin Dahlem.

Prunus tomentosa 'Insularis'. Described as a variety by Koehne (l.c.) who cited material from Japan and material from cultivated plants in Korea. Hedrick (The Cherries of New York 22. 1915) cited this variety as in cultivation in Japan.

Prunus tomentosa 'Spaethiana'. Koehne states this new variety was cultivated in European gardens but the only specimen cited was a Thompson collection, a sterile species in the Herb. Ind. Or. of Hooker and Thompson from Kashmir. The remaining varieties described by Koehne are based on wild specimens collected in China.

Rehder described *Prunus tomentosa* forma *leucocarpa* (Jour. Arnold Arb. 20: 99. 1939) and Krüssman (Handbuch der Laub Gehölze 2: 277. 1961) has recognized this as cultivar 'Leucocarpa'. The holotype of Rehder's form was taken from a plant in the living collections of the Arnold Arboretum donated by Harlan P. Kelsey. Mr. Seth Kelsey has checked the records available and reports the plant was one of a dozen white fruited forms grown from seed obtained directly from Manchuria in 1930. Professor G. L. Slate has indicated that light fruited seedlings are not rare and, in fact, of 148 seeds planted he had 64 germinate, among which were 7 albinos (Proc. Am. Soc. Hort. Sci. 28: 112-113. 1931). *Prunus tomentosa* 'Leucocarpa' is no longer offered commercially.

There have been many attempts to improve the Chinese bush cherry by breeding and selection. Rehder (Bibliogr. Cult. Trees & Shrubs 331. 1949) listed some of the hybrids reported involving *P. tomentosa*. K. Yashiroda reported from Japan on "*Prunus tomentosa* and its improvement" (Gard. Chron. 3rd ser. 88: 109. 1930) and concluded "happily, it is a self-fertile cherry." Slate (l.c.), in an article entitled "Self-unfruitfulness in *Prunus tomentosa*" clearly demonstrated that the majority of strains of this species are instead self-sterile and that less than 6 per cent of open pollinated seedlings were satisfactory as ornamental or fruit-producing plants. Professor Slate was able to select strains for habit and for fruit size. The two best strains were named and distributed as "Geneva" and "Monroe" along with several numbered strains. The selections were also distributed by the New York State Fruit Testing Cooperative Association. Regrettably, these names were never published. The plants received of these selections by the Arnold Arboretum grew, and herbarium specimens were made recording these cultivar names and numbers.

The Dominion Experimental Station, Morden, Manitoba, Canada (Results of Experiments 1931-1937: 55. 1938) named a selection of *Prunus tomentosa* as the Drilea Cherry. *Prunus tomentosa* 'Drilea' was described as "a seedling of a pale yellow Nanking Cherry that has stood up productively on the dry leas during seasons when most of its kin suffered. Bush upright and spreading, vigorous, annual bearer, fruit round, from $\frac{1}{2}$ to $\frac{3}{8}$ inch across, bright red, flesh firm, tender, sweet sprightly, pit small, season mid-July, quality good as dessert, canned, jelly or jam."

In 1946, W. H. Alderman reported the development of three new varieties of Nanking Cherry (Minnesota Horticulturist 74: 28. 1946) given designation as Minnesota No. 41 "Large roundish fruit, requires a pollinizer," Minnesota No. 63 "Very vigorous, large oval fruit, self fertile," and Minnesota No. 64 "Similar to No. 63." In 1949 (Minnesota Horticulturist 77: 37. 1949) the selection Minnesota No. 63 was named 'Orient' and its origin noted to be self-pollinated seed from a self fertile strain of Nanking Cherry obtained in 1925 from O. M. Jensen of Albert Lea, Minnesota. The description is general and unique only for the self fertile characteristic. In 1957 *P. tomentosa* 'Orient' was described again by Alderman, Wilcox and Weir (Minn. Agr. Station Bulletin 441: 12. 1957). *Prunus* 'Orient' was distributed in 1949 and the largest plants had reached a height of seven feet as a bush or small tree.

Not one of these cultivars can be located by name in modern nursery catalogues.

Prunus tomentosa deserves another trial and additional horticultural consideration. The specimens grown at the Case Estates of the Arnold Arboretum are truly handsome shrubs in flower, in foliage and in fruit. The pink flowered strains appeal to more people than do the white flowered forms. The moderate sized fruits are tasty eaten out of hand and make one of the most brilliantly colored jellies. Although the plants are susceptible to peach borer and brown rot fungus, both

afflictions can be controlled without difficulty. The species is used as an indicator plant for indexing certain viruses, but this sensitivity does not impair its life or its beauty.

R. A. HOWARD

A. I. BARANOV

Propagation of *Prunus tomentosa*

Collection, cleaning and storage of seeds.

The fruits of *Prunus tomentosa* are sufficiently mature in the last week of June in the Arnold Arboretum and can be harvested. Once fully ripe, the fruits are enticing to birds and to men, and the crop disappears quickly. Ripe fruits are placed in a small amount of water to allow the pulp to separate from the endocarp generally referred to as the "seed." Finally, cleaning can be done by hand with the aid of a sieve or a strong jet of water. Although it is not good practice to hold seeds of *Prunus* in dry storage for long periods, experimental lots of *Prunus tomentosa* germinated without loss of viability after storage in an unsealed polyethylene bag in a heated room for 21 months. A second lot stored under comparable conditions but in a cloth bag for 45 months produced a 52 per cent germination.

The natural dormancy of *Prunus tomentosa* seeds can be broken down by cold treatment. Seeds sown without cold treatment have not germinated unless well aged. A three month treatment of cold stratification will produce about 98 per cent germination.

Seeds sown in the fall out of doors germinate in the spring. The seeds, however, are attractive to rodents and must be protected with wire mesh. Artificial stratification can be accomplished by placing the seeds in a medium of equal parts sand and peat moss. This, in a plastic bag tightly sealed to be vapor proof, can be placed in a refrigerator at 40 degrees for 3 months. The contents of the bag can then be sown and full germination will occur within a week of sowing. In the Boston area fruits collected in June are stored dry until February, then subjected to cold stratification and sowed directly in mid-May. A stratification beginning in December allows planting in flats in greenhouses in March for transplanting to field locations during the summer.

Cuttings.

Prunus tomentosa rooted readily from softwood cuttings taken in the Boston area in mid-June. A root-inducing substance should then be used and the cutting placed in a polyethylene chamber or under mist.

Bud-grafting.

Bud grafting of selected clones is best accomplished in late July or August using the species as understock. *Prunus tomentosa* seedlings have been used experimentally as a dwarfing rootstock for peaches and plums (Arnoldia 10: 76, 1950) and as an easily transplanted root system for clones of the beach plum *Prunus maritima*.

ALFRED FORDHAM

1964 FALL PROGRAM OF THE ARNOLD ARBORETUM

Field Classes

Friday mornings, 10 a.m.-12 noon
Oct. 2-30

Jamaica Plain
Administration Building

Fall foliage and attractive fruits may be counted upon to extend the garden season. The fall field classes, conducted by Dr. Donald Wyman, will consider these plants, in addition to those perennial favorites, the evergreens. Opportunities are afforded for questions relating to the identification or culture and care of plants hardy in New England. In case of inclement weather, the meetings are held indoors.

Fee \$2.00

Tuesday afternoons, 2 p.m.
Sept. 29-Oct. 27

Case Estates
Weston

The class, led by Dr. Mary Sanders, will become acquainted with the special plantings in Weston, such as ground covers, trees for small areas, late lilies, and the low maintenance garden, as well as with the natural areas. Identification of trees and shrubs in winter and techniques of plant breeding will also be considered. The group will meet at the Barn, 135 Wellesley St., Weston, rain or shine.

Fee \$2.00

Plant Propagation

(short course)

Instruction in the major phases of plant propagation will be given by Mr. Alfred J. Fordham in an irregular schedule planned so that each may be dealt with in proper season. Emphasis will be placed on methods whereby the student can successfully reproduce woody plants at home using simple, inexpensive and readily available equipment. Propagational material will be furnished by the Arboretum. In some cases it will be taken home for treatment while in other instances greenhouse space will be provided. Meetings are scheduled on Saturday mornings and Thursday evenings in October, February, April and June. The first session will be held at Charles Stratton Dana Greenhouses, 1050 Centre Street, Jamaica Plain, on Saturday, October 3, 1964, at 9:30 a.m. A full schedule will be furnished at that time. A sharp knife is needed and casual clothing will be in order. Class size will be limited to 20 participants.

Fee \$10.00

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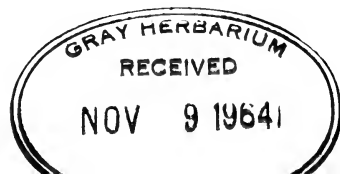
LILIES IN THEIR ORDER OF BLOOM

THE Lily Demonstration Plots of the Arnold Arboretum were started in the fall of 1962, as the result of a cooperative effort between the New England Lily Group of the North American Lily Society and the Arnold Arboretum. At present there are 250 species and varieties of lilies growing in these plots and the majority of them have bloomed in 1963 and again in 1964. During the blooming periods careful weekly notes were taken each year. Since I have had little previous experience in growing lilies, some of the information noted was elementary, especially to the experienced lily grower. However, the best way to become acquainted with any plant is to make frequent observations and take profuse notes, which we did.

The following table is of value because it shows the sequence in which this large collection of lilies has bloomed under the conditions at the Case Estates of the Arnold Arboretum where they are planted. The date of emergence (not given in the following table, but it was April 20-June 1 for almost all of them this year), the height of the tallest stalk, the number of flowers and the size of the flowers on the stalk are all characteristics varying with the age of the bulb, the amount of available water and soil fertility, but it has been interesting, in learning about lily growth, to note such information during the past two years.

Since these lilies are growing in beds adjacent to one another on the same piece of ground, the blooming dates, as well as the number of days of bloom, are comparable. The other notes are given merely "for the record." It was deemed advisable to list the lilies as they come into bloom by weekly intervals. The column listing the number of days the flowers remain in good condition contains some interesting figures for comparison.

Color comparisons are always difficult. The most prominent color in the newly opened flower was compared with the American Horticultural Society's color fan. Most flowers fade as they mature and lilies are no exception. The colors noted are those in the flower the first day it opened. Precise color descriptions cannot



be listed in a table of this type, since one flower may be of several colors—more pronounced toward the center of the corolla, fading to lighter colors towards the edges of the petals; hence these notes are to be considered as only a general indication of flower color. In the column on flower size, the first figure is the overall diameter of the flower; the second figure is the depth of the corolla.

The "type of flower" has been generally indicated thus:

- E — Flower erect on stalk, either bowl-shaped (b) or starry-shaped (s).
 T — Trumpet-shaped, short (s) if corolla is under 5" long; long (l) if 5" or over in length.
 H — Flowers held horizontally on the stalk. This is an excellent trait and makes for a good display.
 N — Flowers nodding on stalk, either pendulous (p) or bell-shaped, or with the flower widely open and petals reflexed (r).

It is hoped that growers who do not see their favorites in this list will send them to the Arnold Arboretum, Jamaica Plain, Mass. for further trial.

Lilies in their Order of Bloom Case Estates of the Arnold Arboretum

Notes taken June–September 1964

Name and Week First Flower Opened	No. Days in Bloom	No. Flowers per Stalk	Size of Flower (width and depth in inches)	Height of Stalk (in inches)	Color	Type of Flower
June 7						
'Beacon'	25	4	5 × 2	38	5YR 7/11	Es
June 14						
'Achievement'	17	9	2½ × 1	26	white	N r
'Adagio'	27	14	3 × 1	44	10R 5/10	H
'Azalia'	18	7	5 × 3	24	7.5YR 7/4	Es
Butterball Strain	44	14	3 × 1	50	5YR 8/6 (varies)	N
Coronado Hybrids	22	3	4 × 3	13	7.5YR 7/11	E b
'Corsage'	26	12	4 × 1	33	2.5R 8/5 to pale yellow	H
'Dieppe'	24	9		34	dark reddish	Es
'Earlibird'	27	12	5½ × 3	25	2.5YR 6/12	
'Fireflame'	26	10	5½ × 3	24	10R 4/9	H
'Grand Slam'	20	14	4½ × 3	38	7.5R 4/1	Es
'Harmony'	25	16	4½ × 3	29	5YR 7/11	E b

June 14 (cont.)

'Lemon Queen'	28	12	$4\frac{1}{2} \times 2$	46	5Y 8/12	H
<i>L. concolor coridion</i>	15	9	1×1	20	5Y 8/12	H
<i>L. dauricum</i>	15	6	$2\frac{1}{2} \times 2\frac{1}{2}$	20	10YR 8/10	E b
<i>L. grayi</i>	14	1	2×2	12	7.5R 5/13	H
<i>L. hansonii</i>	14	4	$2\frac{1}{2} \times \frac{3}{4}$	28	yellow	H
<i>L. kelloggii</i>	16	2	2×2	12	2.5RP 7/8	N p
<i>L. martagon album</i>	15	4	$2\frac{1}{2} \times 1\frac{1}{2}$	27	white to 7.5Y 9/8	N r
'Mountaineer'	18	2	$4\frac{1}{2} \times 1\frac{1}{2}$	20	10R 5/11	E
'Mrs. R. O. Backhouse'	13	16	$3\frac{1}{2} \times 1$	54	5YR 7/11	N r
Paisley Strain	23	11	$2\frac{1}{2} \times 1$	31	2.5RP 9/2	N r
'Queen of Hearts'	20	5	5×2	27	10R 5/11	E s
Rosette Hybrids	42	17	$2\frac{1}{4} \times$	42	5Y 8/12	H
'Scottiae'	25	9	$5 \times 2\frac{1}{2}$	20	10R 6/12	E s
'Sunspot'	19	5	$4\frac{1}{2} \times 1\frac{1}{2}$	20	7.5R 4/11	E s
'Tabasco'	18	13	5×2	32	7.5R 4/11	E s
Terrace City Hybrids	17	14	3×1	53	10YR 7/10	N r
'Toccata'	21	12	4×2	38	7.5YR 8/8	N r

June 21

'Amaryllis'	11	4		18	2.5YR 6/11	E
'Brandywine'	17	2	$3\frac{1}{2} \times 1$	17	5YR 7/11	H
'Brocade'	18	28	$2\frac{1}{2} \times \frac{3}{4}$	58	7.5YR 6/9	N r
'Buttercup'	17	7	$3 \times 1\frac{1}{2}$	44	2.5YR 8/11	N r
'Cinnabar'	19	8	$2\frac{1}{2} \times 2$	20	7.5R 5/13	E
'Corsair'	18	11	$3\frac{1}{2} \times$ —	29	5YR 7/11	E s
'Destiny'	24	6	$5\frac{1}{2} \times 2$	26	5Y 8/12	E s
'Enchantment'	28	25	$5\frac{1}{2} \times 2$	36	10R 6/12	E s
Golden Chalice	37	3	3×2	12	yellow	H
Hybrids						
'Golden Jubilee'	22	10	$4 \times$ —	18	5YR 7/11	E s
'Guinea Gold'	8	11	$1\frac{1}{2} \times \frac{3}{4}$	41	7.5YR 8/8	H
Harlequin Hybrids	18	13	$2\frac{1}{2} \times 1\frac{1}{2}$	34	7.5R 9/3	N r
<i>L. amabile</i>	8	1	$2\frac{1}{4} \times 1\frac{1}{2}$	12	10R 6/12	N r
<i>L. candidum</i>	17	13	$2\frac{1}{2} \times 3\frac{1}{2}$	42	white	T s
<i>L. tsingtauense</i>	22	4	$3\frac{1}{2} \times 2$	20	10R 6/12	E s
'Meadowlark'	20	6	$5 \times$ —	16	7.5Y 9/8	E s
'Mego'	10	3	$4\frac{1}{2} \times 1\frac{1}{2}$	26	2.5Y 9/9	E
'Orchid Queen'	17	8		25	2.5RP 8/5	H
'Overture'	22	12	$2\frac{1}{2} \times 1\frac{1}{2}$	38	2.5YR 9/3	H
'Paprika'	11	6	$5 \times 1\frac{1}{2}$	18	7.5R 4/11	H
'Primadonna'	7	7	2×1	27	7.5R 9/3 to whitish	H
'Prosperity'	19	12	4×2	23	2.5Y 8/12	H

June 21 (cont.)

'Tarantella'	17	11	4 × 2	36	5YR 8/7	N r
'Red Bird'	18	17	4½ × 2	48	7.5R 4/11	H
'Sonata'	22	11	3 × 1½	40	2.5YR 9/6	N r
'Sunshine'	24	12	3 × —	29	2.5Y 8/12	H

June 28

'Amber Gold'	17	9	2½ × 1½	36	2.5Y 8/12	N r
Bellingham Hybrids	18	11	3 × 2	46	10R 6/12	N r
Brigadier Hybrids	29	2	6 × 3	20	5YR 7/8	E
'Bronze Queen'	17	21	2½ × 1½	47	5YR 6/11	N r
Burgundy Ball Strain	6	13	2½ × 2	25	10R 4/9, varies	N
'Croesus'	17	4	5 × 3	10	2.5Y 8/12	Es
'Dora Pinnow'	26	10	4 × 3	42	7.5Y 9/8	N r
'Dunkirk'	21	13	5 × 2	34	7.5R 4/8	E
'Edith Cecillia' × 'Rosabelle #1'	15	14		38	7.5RP 5/12-4/11	H
'Evening Star'	24	14	3¼ × —	27	10R 6/12	Es
'Firecrown'	17	6		24	10R 6/2	Es
'Flame' × 'Xmas Red #4'	11	14	5 × 3	43	7.5YR 6/9	E g
'Gold Flake'	29	2	5 × 2½	15	5YR 7/11	E
'Hurricane'	27	15	3½ × —	34	7.5R 4/11	E
'Joan Evans'	18	7	5 × 2½	24	5YR 7/11	Es
'Lady Lou'	25	32	3½ × —	54	10R 5/11	H
<i>L. amabile luteum</i>	11	7	2½ × 1½	34	5Y 8/12	N r
<i>L. taliense</i>	13	1	2 × 1	36	7.5P 7/7	N r
'Mystic Gold'	27	13	5 × 1½	33	5Y 8/12	H
'Orange' × 'Flame'	18	6	3 × 1		10R 5/11	E
'Primrose Lady'	17	12	2¾ × 1	39	pale yellow	N r
'Rosabelle'	18	6	4 × —	26	10R 7/4	Es
'Rose Dawn'	18	9	3 × 1	33	5R 6/11	H
Sentinel Strain	15	4	5½ × 5	29	white	T l
'Shuksan'	11	5	2½ × 2	31	7.5YR 7/11	N r
'White Princess'	30	8	3 × 1½	31	7.5R 9/3	N r

July 5

African Queen Strain	24	11	5 × 3½	50	10YR 8.5/7	T s
'Afterglow'	16	6	2½ × —	30	7.5R 5/13	
'Amethyst Temple'	19	8	5 × 4	49	2.5RP 6/10	T s
Apricot Royal Trumpets	16	3	5 × 4	29	10YR 8/10, varies	T s
Bronzino Strain	7	6	2½ × 1½	24	yellowish bronze	N r
'Burnished Gold'	21	17	6 × 6	56	7.5Y 9/8	T l

July 5 (cont.)

Carrara Strain	17	7	6×5	36	white to yellow	T l
Celestial Hybrid						
Helies Strain	23	9	5×4½	44	5Y 9/9	T s
'Dainty Lass'	16	1	5×4	23	10P 6/10	T s
'Delicious'	20	23	3¼×—	35	7.5YR 7/11	E
Fascination Strain	15	13	7×7	50	white	T l
'Gold Urn' × <i>philadelphicum</i> #2	11	4		18	7.5R 6/12	E s
'Golden Clarion'	16	2	4½×3½	29	5Y 9/9	T s
Golden Showers Strain	31	6	5×3½	42	10Y 9/10	N r
Golden Splendor Strain	18	4	5½×4½	34	5Y 9/9	T s
'Green Dragon'	7	4	7×5	36	pale yellow	T l
'Lemon Fair'	7	2	5×4	24	white to yellowish	T s
'Lemon Lady'	11	2	3×1	16	5Y 9/9	H
<i>L. cernuum</i>	21	12	1½×1	15	5RP 8/5	N r
<i>L. davidii macranthum</i>	29	90	3×½	60	3.5YR 6/12	N r
'Limelight'	16	5	6×4	36	7.5Y 8/12	T s
Majestic Hybrids	22	12	5×5	43	10P 8/6 to white	T l
Majestic Strain	15	4	6×4½	32	2.5GY 8/6	T s
'Red Knight'	25	27	4×1½	37	7.5R 3/7	H
'Rose Queen'	9	10	3×1	31	7.5RP 7/10	N r
Shelburne Yellow Trumpets	16	5	5×5	44	7.5Y 9/8	T l
'Spitfire'	19	16	3½×2	27	10R 6/12	E s
'Sun Temple'	23	7	4½×5	49	7.5Y 9/8	T l
'White Gold'	10	5	2¾×1	29	pale yellow	N r
White Trumpets	16	4	5×5½	38	white	T l
'Winter Sunset'	14	7	5½×4½	41	10P 7/8 to whitish	T s

July 12

'Big Tom'	25	12	7×4	42	10YR 8/10	T s
'Black Dragon'	15	4	7×5	44	white to 5RP 2/8	H
Black Magic Strain	15	4	5×5	47	white to purplish	H
'Bright Star'	21	5	5½×2	33	yellowish to white	N r
Burgundy Strain	15	7	2½×1	14	7.5R 4/11	N r
'Charity'	21	9	7×4	25	5Y 5/13	T s
'Damson'	16	3	4½×4	26	2.5RP 3/10	T s
'Edith Cecillia'	7	26	2×1	20	2.5R 9/3	N r
'Golden Royal Trumpet'	13	8	5×5	47	5Y 9/9	T l
Golden Trumpets Strain	28	9	7×3	40	7.5Y 9/8-2.5YR 7/10	N r
Golden Wedding Strain	19	25	3½×1	30	7.5Y 9/8	N r
Green Knight Flares Strain	16	12	6×4½	46	2.5Y 8/12	T s

July 12 (cont.)

Green Magic Strain	10	1	$4\frac{1}{2} \times 4$	40	white	T s
'Hearts Desire'	18	5	$5 \times 3\frac{1}{2}$	31	white	T s
'Honeydew'	17	3	$5 \times 4\frac{1}{2}$	20	10Y 9/8	T s
Inca Princess Strain	12	18	8×3	46	pale greenish yellow	H
'Lemon Royal Bowl'	19	6	5×4	38	7.5Y 8/12	H
'Life'	17	4	$4\frac{1}{2} \times 4$	34	5Y 8.5/12	T s
<i>L. longiflorum</i> (tetraploid)	13	2	4×6	14	white	T l
<i>L. regale</i>	22	5	5×6	48	white to pinkish	T l
<i>L. sargentiae</i> Hybrids	25	6	6×6	31	white to greenish	T l
'Luna'	21	9	5×5	48	10Y 9/6	T l
'Matawee'	10	5	6×5	46	pale yellow	H
Moonlight Strain	19	2	6×5	33	5Y 9/9	T l
Olympic Hybrids	12	2	5×5	30	white	T l
Pink Perfection Strain	16	6	$3\frac{1}{2} \times 3\frac{1}{2}$	33	pale pink, varies	T s
Pink Sunburst Strain	25	6	$5 \times 3\frac{1}{2}$	36	white to pink	H
'Red Torch'	14	20	$4\frac{1}{2} \times 1\frac{1}{2}$	32	7.5R 5/13	H
Shelburne Pink						
Trumpets	17	8	$4 \times 4\frac{1}{2}$	33	2.5RP 6/10	T s
'Shenandoah'	18	6	$5 \times 2\frac{1}{2}$	38	pale yellow to deep orange	N r
'Stardust'	18	6	6×2	42	white	H
'Sunlight'	14	7	$6 \times 3\frac{1}{2}$	34	5Y 8.5/12	H
'Thunderbolt'	19	7	8×5	42	5YR 7/11	N r
'Victory'	44	5	$3\frac{1}{2} \times 1$	18	2.5YR 6/13	H
'Warrior'	10	9	$6 \times 2\frac{1}{2}$	27	2.5R 4/10	H
'Whiteface'	14	2	$5 \times 4\frac{1}{2}$	31	white	T s
'Wildfire'	10	14	$4\frac{1}{2} \times 4\frac{1}{2}$	24	7.5R 4/11	H
'Yellow Regal'	19	3	$4\frac{1}{2} \times 4$	24	7.5Y 9/10	T s

July 19

'Autumn Glory Flares'	16	8	5×2	42	5YR 7/11	H
'Cupid'	9	1	4×4	19	white to pinkish	
'Golden Royal Corona'	22	8		33	5Y 9/9	H
'Greatheart'	11	4	$4 \times 3\frac{1}{2}$	27	7.5YR 8/8	H
'Lady Alice'	18	6	6×2	40	white to yellowish	H
<i>L. canadense flavum</i>	10	6	$4 \times 2\frac{1}{2}$	46	2.5Y 8/12	N r
<i>L. margaton cattaniae</i>	10	8	$1\frac{1}{2} \times 1\frac{1}{2}$	20	reddish black	N r
<i>L. tigrinum</i>	28	7	$4 \times 2\frac{1}{2}$	36	10R 6/14	N r
'Lovely Lady'	7	1	5×4	17	white	H
'Mystic Virgin'	16	8	6×4	28	white to greenish	N p
Pink Glory Strain	23	7	$6 \times 1\frac{1}{2}$	30	white to 2.5 RP 9/10	H
'Pioneer'	9	3	5×4	20	5Y 8.5/12	T s

July 19 (cont.)

Superba Strain	18	21	$5\frac{1}{2} \times 3$	46	creamy white	N
'Wahula'	28	12	6×6	36	2.5Y 9/9	H

July 26

'Canary'	18	4	$3\frac{1}{2} \times 1\frac{1}{2}$	34	5Y 8.5/12	
Centennial Hybrids	13	3	$9\frac{1}{2} \times 2\frac{1}{2}$	17	white	H
Barryi Hybrids	18	3	$7 \times —$	27	very pale yellow, varies	H
'Black Beauty'	22	5	$2 \times —$		2.5R 8/7	H
'Canary'	18	4	$3\frac{1}{2} \times 1\frac{1}{2}$	34	5Y 8.5/12	H
'Cherry Glow'	9	3	5×5	21	white to reddish	T l
'Eventide'	14	4	5×2		7.5YR 8/9 to white	H
Golden Showers Strain	15	2	$6 \times 2\frac{1}{2}$	30	5Y 8.5/12	
'Good Hope'	19	8	6×2	34	2.5Y 8/12	H
'Imperial Crimson'	26	13	$7\frac{1}{2} \times 3\frac{1}{2}$	42	white	H
<i>L. henryi citrinum</i>	19	22	4×2	72	5Y 8/12	H
'Mme. Edouard Debras'	21	13	6×4	36	7.5Y 9/8	H
'Mystic Star'	11	5		30	5R 5/13	H
'Reverie'	11	3	$5 \times —$	36	white to yellowish	
'Silvervine'	10	4	6×3	40	white	H

August 2

Centennial Hybrids	13	3	$9\frac{1}{2} \times 2\frac{1}{2}$	17	white	
Imperial Silver Strain	15	11	6×2	42	white	H
<i>L. formosanum wilsonii</i>	5	2	4×6	17	white	T l
<i>L. leichtlinii</i>	14	4	$2\frac{1}{2} \times 1$	40	10Y 9/9	H

August 9

Crimson Dream Strain	14	5	6×2	35	10RP 4/12 to white	H
Imperial Gold Strain	17	6	9×6	51	white to yellowish	H
'Jamboree'	26	5	5×2	38	7.5RP 5/12	H

August 16

'Ellabee'	17	6	4×2	48	white	H
<i>L. auratum platyphyllum</i>	17	4	5×4	36	white	T s

August 23

<i>L. speciosum album</i>	20	4	$6 \times 2\frac{1}{2}$	34	white	H
Superstar Strain	30	11	$3\frac{1}{2} \times 1\frac{3}{4}$	40	7.5RP 5/4 to white	H

August 30

<i>L. brownii australe</i>	11	2	4×6	60	white	T l
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DONALD WYMAN

ARNOLDIA



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THE NEW HEDGE DEMONSTRATION PLOT

A COMPLETE study of the old Hedge Demonstration Plot of the Arnold Arboretum was published in *Arnoldia* 17: 17-32, April 12, 1957. Most of those hedges had been growing on the site by the Bussey Building since 1936. However, when the Charles Stratton Dana Greenhouses were erected in 1962, a hedge demonstration site was prepared in this newly developed greenhouse area. Some of the hedges were moved to the new site, the old one being abandoned. The hedges which were moved are marked with asterisks in the following list.

The majority of the hedges for the new site were made from plants bought or given to the Arnold Arboretum in 1962 or 1963 specifically for this purpose. Most were plants $1\frac{1}{2}$ -5' tall. Nearly all of the deciduous ones among these were cut to within a few inches of the ground as soon as they were planted in hedge formations and the few older deciduous hedges which were moved from the old site were treated similarly. The evergreen hedges, of course, were not pruned back so severely when they were transplanted. The measurements here given were taken in November 1964, after two full growing seasons.

The peculiar plan for this new site was made necessary because of an underground drain. This is flanked on either side by a right of way reserved by the City of Boston to allow for possible alterations of the drain at some future time.

Hedges planted 1963

*=Moved from old Hedge Collection. The remainder were planted as young plants in 1963.

	Map Location	Measurements in Feet Height	Width
<i>Acanthopanax sieboldianus</i>	48a	3	1
<i>Abies concolor</i>	28	$1\frac{1}{2}$	2
<i>Acer campestre</i>	13	$1\frac{1}{2}$	1
* <i>Acer ginnala</i>	14	$1\frac{1}{2}$	2
<i>Acer saccharum</i> 'Globosum'	59b	$1\frac{1}{2}$	$1\frac{1}{2}$

	Location	Height	Width
<i>Berberis mentorensis</i>	49a	1 $\frac{1}{2}$	1
<i>B. thunbergii</i>	49c	1	1 $\frac{1}{2}$
<i>B. thunbergii atropurpurea</i>	49b	1 $\frac{1}{2}$	1
<i>B. thunbergii</i> 'Crimson Pygmy'	44	1 $\frac{1}{2}$	1
<i>B. thunbergii</i> 'Erecta'	38b	1	1 $\frac{1}{2}$
* <i>B. thunbergii minor</i>	37	1	1
<i>Betula populifolia</i>	15	2	1 $\frac{1}{2}$
<i>Buxus</i> 'Curly Locks'	16	1 $\frac{1}{2}$	1 $\frac{1}{2}$
* <i>B. microphylla koreana</i>	23	3	3
<i>B.</i> 'Tide Hill'	24a	1	1
<i>Caragana arborescens</i>	60a	2	1 $\frac{1}{2}$
<i>Carpinus betulus</i>	1	2	1 $\frac{1}{2}$
<i>Chaenomeles speciosa</i>	40a	1	1
<i>Chamaecyparis pisifera filifera</i>	36a	1 $\frac{1}{2}$	1
<i>C. pisifera plumosa</i>	36b	2	2
<i>Cornus mas</i> 'Flava'	63	3	2
<i>Crataegus crus-galli</i>	5	3	2
<i>C. phaenopyrum</i>	59a	2	1 $\frac{1}{2}$
<i>Deutzia gracilis rosea</i>	46a	2	1 $\frac{1}{2}$
<i>Elaeagnus angustifolia</i>	62a	2 $\frac{1}{2}$	2
<i>Euonymus alata</i> 'Compacta'	8	1	1
<i>E. fortunei vegeta</i>	30a	1 $\frac{1}{2}$	1 $\frac{1}{2}$
<i>Fagus sylvatica</i>	6	2	1 $\frac{1}{2}$
<i>Forsythia intermedia</i> 'Spectabilis'	65	3	2
<i>Gleditsia triacanthos inermis</i>	4	2	1 $\frac{1}{2}$
* <i>Ilex crenata convexa</i>	25a	3	3
* <i>I. opaca</i> 'Clark'	24b	1 $\frac{1}{2}$	1 $\frac{1}{2}$
<i>Juniperus virginiana</i>	34b	3	2
* <i>Kolkwitzia amabilis</i>	51a	2	2
<i>Ligustrum amurense</i>	50a	2	1
<i>L. ibolium</i>	50b	3	3
<i>L. obtusifolium</i> 'Regelianum'	42	2	2
<i>L. ovalifolium</i>	43a	2	2
* <i>L. vicaryi</i>	50c	1	1
* <i>L. vulgare</i>	43b	2	2
* <i>L. vulgare</i> 'Lodense'	30b	1	1 $\frac{1}{2}$
<i>Lonicera fragrantissima</i>	67	4	3
* <i>Lonicera tatarica</i>	61a	2	2
* <i>Malus</i> sp. dwarf	52b	3	2 $\frac{1}{2}$
* <i>Philadelphus coronarius</i>	61b	3	3
* <i>P. lemoinei</i> 'Erecta'	38a	2	2
* <i>Physocarpus intermedius parvifolius</i>	47a	2	1
<i>P. opulifolius</i>	47b	3	2 $\frac{1}{2}$
<i>Picea abies</i>	21	2	3
* <i>P. omorika</i>	33b	3	4



1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15.

22. 29. a. b. a. b. 43. a. b. 52. a. b. 53. a. b. 54. a. b. 55. a. b. 56. a. b. 57. a. b. 58. a. b. 59. a. b. 60. a. b. 61. a. b. 62. a. b. 63. a. b. 64. a. b. 65. a. b. 66. a. b. 67. a. b. 21. 28. a. b. c. 35. 42. a. b. 49. a. b. 50. a. b. 51. a. b. 40. a. b. 39. a. b. 38. a. b. 45. 46. a. b. 47. a. b. 48. a. b. 36. a. b. 37. 34. a. b. 33. a. b. 32. a. b. 31. a. b. 30. 26. a. b. 25. a. b. 24. a. b. 23. 20. a. b. 19. 18. a. b. 17. a. b. 16. 15. 14. 13. 12. 11. 10. 9. 8. 7. 6. 5. 4. 3. 2. 1.

PLATE IX

The new Hedge Demonstration Plot at the Arnold Arboretum, photographed Nov. 17, 1964.

| | Location | Height | Width |
|--|----------|--------|-------|
| * <i>Picea orientalis</i> | 33a | 3 | 3 |
| * <i>P. pungens glauca</i> | 32b | 4 | 4 |
| <i>Pinus mugo prostrata</i> | 39a | 1 | 1 |
| <i>P. strobus</i> | 22 | 3½ | 3 |
| <i>P. sylvestris</i> | 29 | 4 | 3½ |
| <i>Potentilla fruticosa grandiflora</i> | 56 | 2 | 1½ |
| <i>Prinsepia sinensis</i> | 51b | 1 | 1 |
| * <i>Pseudotsuga menziesii glauca</i> | 32a | 4 | 4 |
| <i>Quercus palustris</i> | 10 | 2 | 1½ |
| <i>Rhamnus cathartica</i> | 11b | 1 | 1 |
| <i>R. frangula</i> | 11a | 2 | 2 |
| <i>R. frangula 'Columnaris'</i> | 54 | 4 | 2 |
| <i>Rhododendron yedoense poukhanense</i> | 58b | 1 | 1 |
| <i>Ribes alpinum</i> | 41 | 3 | 2½ |
| <i>Rosa rugosa</i> | 57 | 3 | 2 |
| <i>Salix pentandra</i> | 48b | 3 | 2 |
| <i>Spiraea bumalda 'Anthony Waterer'</i> | 46b | 2 | 2 |
| * <i>S. prunifolia</i> | 64 | 2 | 2 |
| <i>S. vanhouttei</i> | 53 | 2½ | 2 |
| * <i>Syringa chinensis</i> | 12a | 2 | 2 |
| * <i>S. laciniata</i> | 60b | 2 | 2 |
| <i>S. 'Vestale'</i> | 12b | 1 | 1 |
| * <i>Taxus cuspidata</i> | 19 | 4 | 4 |
| * <i>T. cuspidata nana</i> | 31 | 1½ | 4 |
| * <i>T. media 'Hatfieldii'</i> | 20b | 3 | 2½ |
| * <i>T. media hicksii</i> | 20a | 3 | 5 |
| * <i>Thuja occidentalis</i> | 35a | 4 | 4 |
| * <i>T. occidentalis 'Globosa'</i> | 17a | 2½ | 4 |
| * <i>T. occidentalis 'Pumila'</i> | 17b | 2 | 2½ |
| * <i>T. occidentalis 'Robusta'</i> | 35c | 3½ | 3½ |
| * <i>T. occidentalis 'Spiralis'</i> | 35b | 5 | 2 |
| * <i>T. plicata</i> | 18 | 3 | 3½ |
| <i>Tilia cordata</i> | 3 | 2 | 2 |
| <i>Tsuga canadensis</i> | 27 | 2 | 1½ |
| * <i>T. canadensis 'Compacta'</i> | 25b | 3 | 2 |
| <i>T. canadensis 'Stricta'</i> | 39b | 1 | 1 |
| <i>T. caroliniana</i> | 26 | 1 | 1 |
| * <i>Ulmus parvifolia</i> | 62b | 2 | 1 |
| <i>U. pumila</i> | 2 | 4 | 2 |
| * <i>Viburnum dentatum</i> | 66b | 2½ | 2 |
| * <i>V. prunifolium</i> | 66a | 1 | 1 |
| <i>V. trilobum 'Compactum'</i> | 52a | 2 | 1½ |

DONALD WYMAN

ARNOLDIA



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BONSAI AT THE ARNOLD ARBORETUM

“THE Larz Anderson collection of Japanese dwarf trees presented to the Arnold Arboretum as a memorial to his friend, Charles Sprague Sargent,” is an explanatory statement quoted from the carved inscription displayed with these intriguing plants. This group of dwarfed trees was given to the Arboretum in the fall of 1937. The plants have been on public display in a specially erected shade house ever since. Brought to this country at a time when strict plant quarantines were not in force, these plants were imported with soil around the roots in their original Japanese containers. The Arboretum welcomes the opportunity of being able to display these striking examples of Japanese horticulture.

The honorable Larz Anderson became interested in Japanese horticulture as early as 1907 and built a particularly attractive Japanese garden on his estate in Brookline, Massachusetts. Somewhat later he became interested in dwarf trees and in 1913 he brought back from Japan a splendid collection of them, which he acquired while serving as Ambassador Extraordinary from the United States to Japan (1912-1913). These he placed on display in his own garden where they were carefully tended for twenty-five years by different Japanese gardeners. When he died, his wife presented the collection to the Arnold Arboretum.

In 1962 this fine collection was moved to a specially built lath house in front of the new Charles Stratton Dana Greenhouses. Here the plants are given the necessary shade and the pots in which they are growing, all originals from Japan, are displayed to good advantage. There is overhead irrigation so that on hot days the atmosphere about the plants can be moist. They are taken into a cold house for the winter months, so that the plants and the pots will not freeze, and then returned to their display house in early May.

There are twenty-seven specimens, ranging in age from 56 to 226 years. Pruning and other care is given by our own work crew. This collection has been shown at one time or another in most of the major flower shows of the East, but because of its great value (as well as the great weight of some of the pots!) it is

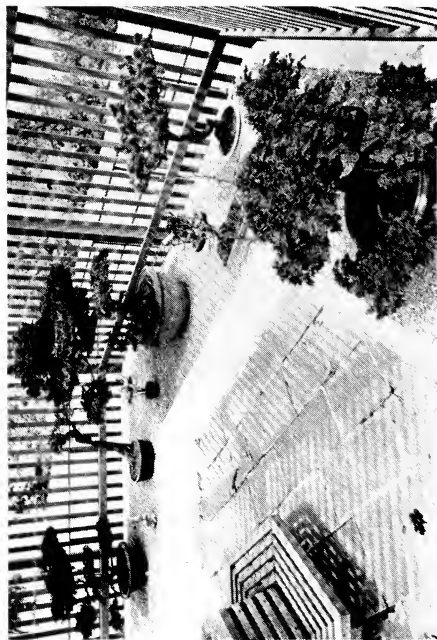
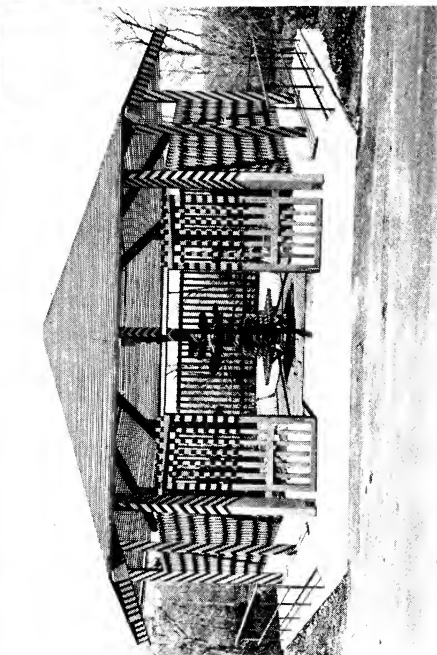
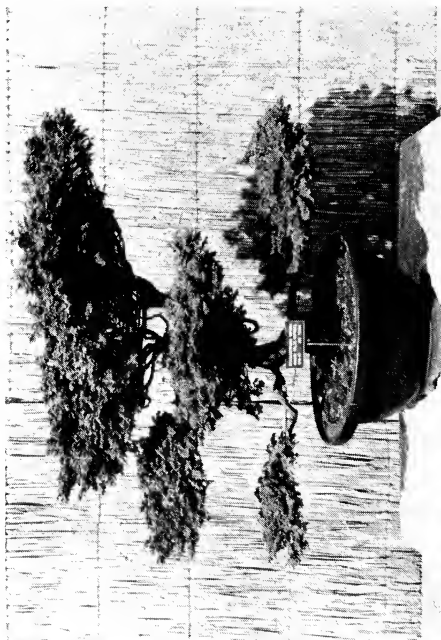


PLATE X

Upper left: *Chamaecyparis obtusa*; 175 years old. Upper right: *Chamaecyparis obtusa*; 160 years old. Lower left and right: The new Bonsai house in front of the Charles Stratton Dana greenhouses at the Arnold Arboretum, with plants conveniently displayed.



PLATE XI

Upper left: *Acer buergerianum*: 110 years old. Upper right: *Chamaecyparis pisifera squarrosa*: 65 years old. Lower left: *Pinus parviflora*: 75 years old. Lower right: *Chamaecyparis obtusa*: 130 years old.

not expected that the collection will again leave the Arnold Arboretum.

Recently there has been a surge of interest in Bonsai. In order to assist those who wish to learn more about the art some of the more recent books on the subject are listed here.

Brooklyn Botanic Garden's publication, *Plants and Gardens*, Vol. 9, No. 3, 1953, entitled, "Dwarfed Potted Plants as the Japanese Grow them."

Chidamian, Claude. "Bonsai. Miniature Trees" D. Van Nostrand Co., Princeton, N.J. 96 pp. 1955.

Kawamota, Toshio and Joseph Y. Kurihara. "Bonsai-Saikei" Nippon Saikei Co., Tokyo, Japan. 361 pp., ill. 1963.

Yashiroda, Kan. "Bonsai" Charles T. Branford Co., Newton, Mass. 166 pp., ill. 1960.

Yoshimura, Yugo and Giovanna M. Halford. "The Japaaese Art of Miniature Trees and Landscapes" Chas. E. Tuttle & Co., Rutland, Vt., and Tokyo, Japan. 220 pp. 1957.

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